



Volume 18, No. 12      December 1999

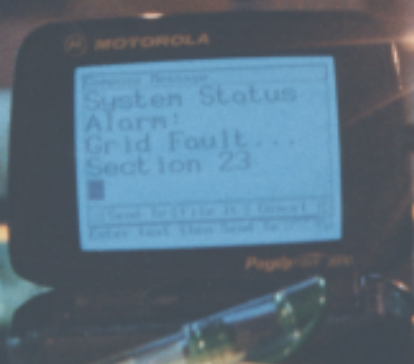
# Monitoring Times

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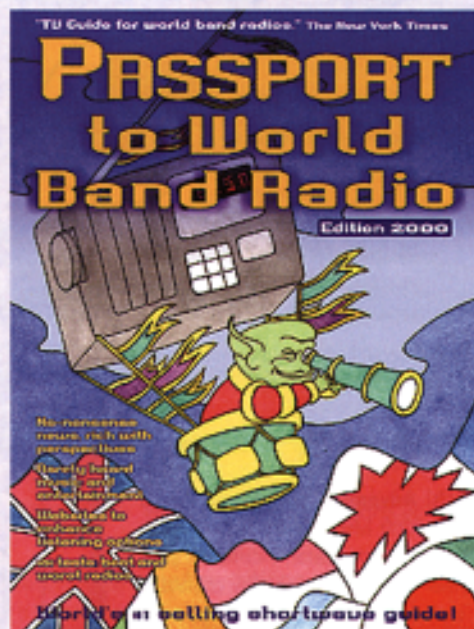
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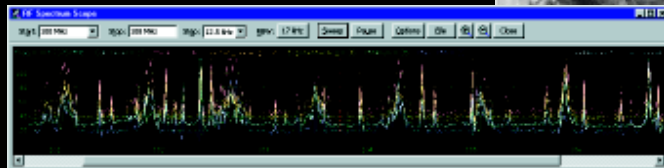
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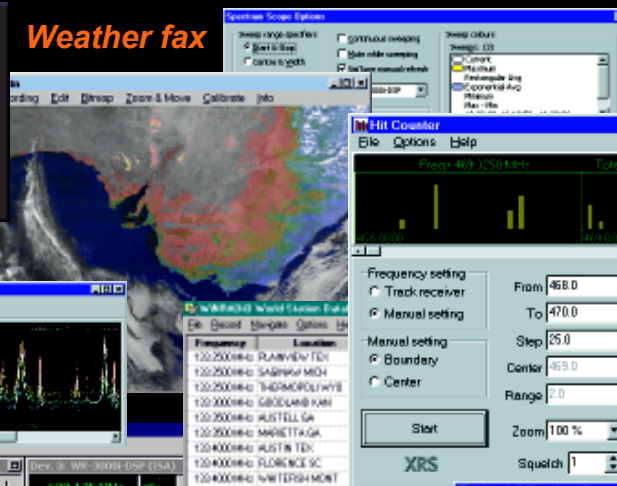
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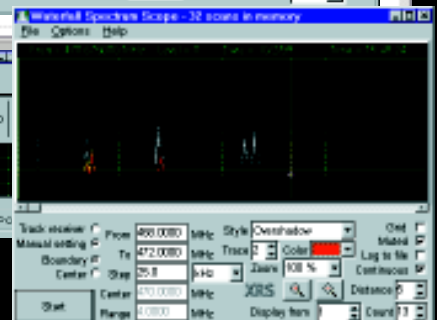
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Cover Story

## Tuning in to the Power Grid

By Larry Van Horn

The Year 2000 computer glitch may turn out to be a test of modern-day survival skills, it may be a crisis narrowly-averted, or it may be a tempest in a teapot. We'll soon know whether the nation's utilities are as well prepared as they say they are.

Regardless of the outcome, knowing how to monitor your local utility companies is a wise idea anytime, but you can't wait until a crisis happens to start looking for frequencies. The article starting on page 10 gives you a head start in your search, plus a comprehensive profile of the TVA communications system.

Cover photo by Robert Wyman.

## CONTENTS

### Around the World by Radio ..... 16

By Dave White

Shortwave listeners are in a unique position to stage an all-day, all-night party at the turn of the century by tuning in each of the world's 24 time zones as midnight arrives! Since time zones can get pretty complicated (Daylight Savings Time in the southern hemisphere, etc.), the author has already done a lot of the legwork for you.



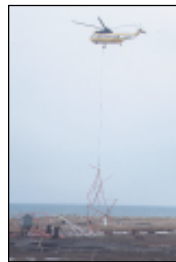
### Filters - The Critical Element ..... 20

By Ian Poole

The two primary functions of any receiver are to amplify signals and to sort out the desired signal from the other ones around it (selectivity). Selectivity is a function of filters; knowing how they work and how to interpret selectivity specifications can help you evaluate the performance of a receiver.

### The Rise and Fall of WCC ..... 24

By Timothy Wood



Antennas which once carried traffic for the busiest ship-to-shore station on the globe have now been dismantled: WCC, Chatham, Massachusetts, is off the air for good. Founded by Marconi, the once-pioneering station has been by-passed by satellite technology, though its buildings still remain a monument to history.

### Aiming Your HF Antenna ..... 66

By Douglas Blakeslee

The propagation may be in, but are you getting the most out of your directional antenna?

## Reviews:

After looking at the receiving side of the KC-505 transceiver, Magne says the proposed Kachina KC-105CRX receiver "should knock the socks off other PC-controlled receivers" (p.94).



"Low cost doesn't have to mean lower performance," says Parnass of the Uniden BC248CLT bedside scanner-clock (see p.96). Family Radio Service *plus* Weather Radio?! The Cobra MicroTalk 310 WX has Elliott crowing, "Thumbs up for a job well done!" (p.91).

Plug your receiver or transceiver's audio output into your computer via the tiny Tigertronics BP-2M modem and digital doors are suddenly open to you at a bargain price! (p.105) Short and medium wave reception on wideband handheld scanners is notoriously dismal; Active Duck comes to the rescue! (See p.104)





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Address: P.O. Box 98, 7540  
Highway 64 West,  
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0098  
Telephone: (828) 837-9200  
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Internet Address: [www.grove-ent.com](http://www.grove-ent.com) or  
e-mail: [mt@grove-ent.com](mailto:mt@grove-ent.com)  
Editorial e-mail: [mtditor@grove-ent.com](mailto:mtditor@grove-ent.com)  
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#### Owners

Bob and Judy Grove  
[judy@grove-ent.com](mailto:judy@grove-ent.com)

#### Publisher

Bob Grove, W8JHD  
[bgrove@grove-ent.com](mailto:bgrove@grove-ent.com)

#### Managing Editor

Rachel Baughn, KE4OPD  
[mtditor@grove-ent.com](mailto:mtditor@grove-ent.com)

#### Assistant Editor

Larry Van Horn, N5FPW

#### Art Director

Belinda McDonald

#### Advertising Svcs.

Beth Leinbach  
(828) 389-4007  
[beth@grove-ent.com](mailto:beth@grove-ent.com)

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## EDITORIAL STAFF

Correspondence to columnists may be mailed c/o *Monitoring Times*; any request for a reply should include an SASE.

Frequency Manager .....	Gayle Van Horn .....	<a href="mailto:gayle@grove.net">gayle@grove.net</a>
Frequency Monitors .....	Mark J. Fine .....	<a href="mailto:fineware@erols.com">fineware@erols.com</a>
	Dan Roberts	
Program Manager .....	Jim Frimmel .....	<a href="mailto:frimmel@star-telegram.com">frimmel@star-telegram.com</a>
American Bandscan .....	Doug Smith, W9WI .....	<a href="mailto:w9wi@bellsouth.net">w9wi@bellsouth.net</a>
And More! .....	Jock Elliott KB2GOM .....	<a href="mailto:lightkeeper@sprintmail.com">lightkeeper@sprintmail.com</a>
Antenna Topics .....	W. Clem Small, KR6A .....	<a href="mailto:clemsmall@bitterroot.net">clemsmall@bitterroot.net</a>
Beginner's Corner .....	T.J. Arey, WB2GHA .....	<a href="mailto:tjarey@home.com">tjarey@home.com</a>
Below 500 kHz .....	Kevin Carey, WB2QMY .....	<a href="mailto:lowband@gateway.net">lowband@gateway.net</a>
Computers and Radio .....	John Catalano .....	<a href="mailto:j_catalano@conknet.com">j_catalano@conknet.com</a>
Digital Digest .....	Stan Scalsky .....	<a href="mailto:sscalsk@mail.ameritel.net">sscalsk@mail.ameritel.net</a>
	Mike Chace	
Experimenter's Wkshp .....	Bill Cheek .....	<a href="mailto:bcheek@comtronics.net">bcheek@comtronics.net</a>
Federal File .....	Larry Van Horn, N5FPW .....	<a href="mailto:larry@grove-ent.com">larry@grove-ent.com</a>
K.I.S. Radio .....	Richard Arland, K7SZ .....	<a href="mailto:k7sz@epix.net">k7sz@epix.net</a>
Magne Tests .....	Lawrence Magne	
Milcom .....	Larry Van Horn N5FPW .....	<a href="mailto:larry@grove-ent.com">larry@grove-ent.com</a>
On the Ham Bands .....	Ike Kerschner, N3IK .....	<a href="mailto:N3IK@hotmail.com">N3IK@hotmail.com</a>
Outer Limits .....	George Zeller .....	<a href="mailto:George.Zeller@acclink.com">George.Zeller@acclink.com</a>
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### Bill Cheek Diagnosed with Cancer: An appeal to our readers

Bill Cheek, editor of the "Experimenters Workshop" column in *Monitoring Times* for the past eight years, and author of a series of books on scanner modifications, was diagnosed with incurable lung cancer at the end of September. Without treatment, doctors give him about 3-4 months to live.

Bill intends to fight the cancer, but he could use our help. Bill welcomes your prayers on behalf of him and his family, and any information you might have on the latest cancer research and developments.

Expressions of concern are welcome, but he'll have little energy for personal replies.

If you so desire, you can also help with your contributions. Bill does not have medical insurance. He is self-employed at Comtronics and has two daughters in college. Furthermore, Bill has been indicted in a New York federal court on charges related to his scanner business and widely-available "data slicer" technology.

A trust fund has been set up by friends and family to help toward medical expenses.

Checks can be made out to "Cynthia Cheek trustee for William D. Cheek, Sr." and sent to: Union Bank of California, Acct# 0771354719, 8359 Mira Mesa Blvd, San Diego, CA 92126, Attn: Rhonda or Kevin Smith (619) 230-3800

Though always a controversial figure, there is no disputing the fact that Bill has devoted his life to the love of radio and technology. Please give this appeal your serious consideration and circulate it among your scanner friends.

### The Evolution of MT

Nothing remains static, and neither does *Monitoring Times*, as long-time readers know well. With the turn of the year and the century, we'll be experiencing a few staff changes. Rich Arland is leaving the "KIS Radio" column to undertake writing assignments elsewhere. Rich has done a good job of passing along inexpensive ways to enjoy the radio hobby, whether you're a ham, SWL, or scanner buff.

Also leaving our pages is the column which alternated with "KIS Radio" - "PCS Front Line." Although Dan Veeneman did an out-

standing job of sorting out new trends and technologies, our readers made it clear they didn't want to read about it in *MT*! We believe it is smart to understand new technology, even though it might be construed as "the enemy," but we'll shelve those topics for now and make room for columns of more immediate use to readers and radios.

Obviously Bill Cheek has more on his plate than writing the "Experimenters Workshop" column (see our boxed appeal). Instead of finding a new author for the column, we will be inaugurating a couple of new project columns, including one which will walk you through old radio restorations.

Many thanks to Rich Arland, Dan Veeneman, and Bill Cheek for their dedication and enthusiasm to radio and for sharing their knowledge in the pages of *Monitoring Times*. Watch for our January issue to see what we have up our sleeve for the year 2000!

### MT Reader's Moment of Fame

There is a phone booth in the middle of the Mojave Desert just begging to be answered - and one longtime *MT* subscriber did just that.

*Continued on page 106*

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## Boston to ring in New Year five hours early

Boston plans to pop its champagne corks at 7 p.m. "We'll be marking the millennium when it's midnight in Greenwich, according to Greenwich Mean Time, which is the universally accepted standard of time for the world," Mayor Tom Menino said Tuesday.

The plan means Boston would be the first U.S. city to celebrate the new year. But why should Boston (of all places) join the British? Even though midnight at 0 degrees longitude is 0000 by Universal Time, the first spot on the globe to see the year 2000 is actually in the middle of the Pacific.

While it's still 1100 GMT/UTC on December 31st in merry olde England, it'll be turning the year 2000 on the International Date Line. Boston could beat out fellow East Coast cities by 17 hours! (See our feature article for more on following the New Year around the world.)

## White House to coordinate Y2k monitoring

The White House plans to start its monitoring of potential Y2k consequences when New Zealand passes into the year 2000. The Information Coordination Center will send assessments to government officials responsible for responding to Y2k problems in their area of responsibility. It will also communicate with key industries and the public should any electronic disruptions occur.

Several agencies will also be on the alert for "malicious activity around Y2k" – cyber attacks and malicious mischief from outside or even inside sources. The Center will gear up for 24-hour monitoring in the last week of December.

## Banks Okay to Go

Federal regulators conducted a massive audit of the banking industry to test its Y2k readiness and reported that 99 percent of banks, ATM vendors and service providers have passed the test. The primary difficulty is now is trying to anticipate how much additional cash jittery customers will withdraw.

## Postal Customers Not Amused

The US postal service mounted millennium countdown clocks in a number of offices around the country. Now many of them are being removed – particularly in Texas and California. Customers in those states felt the clocks increased their level of stress, as they

count down the days, hours, minutes, and seconds until the new millennium. Some said it reminded them of their own mortality – or of how long they had been waiting in line!

## Should Have Used UTC

While Israel rolled its clocks back one hour in September, the Palestinian West Bank remained on summer time – with deadly results to three Palestinian terrorists. En route to targets in Haifa and Tiberius, their bombs, set for 6 p.m., went off at 5 p.m. Thanks to Chuck Shepherd's "News of the Weird" column for that one.



## Y2k just a warm-up exercise?

The U.S. government is concerned about terrorists who not only know the time of day, but may even know how to manipulate it! The Pentagon has created a cyberwarfare center to develop defensive – and offensive – tactics in the war to invade computer systems critical to national security.

The government has also helped the banking industry establish a private computer network to share information about electronic threats to financial institutions. Similar centers are planned for seven other industries, including telecommunications, oil and gas, electrical power, transportation, and the water supply system.

Meanwhile, private consulting firms such as SANS Institute of Bethesda, Md., are alerting systems administrators (the good geeks) and security personnel on the need to cooperate with each other against potential "renegeeks."

Even so, the Government Accounting Office (GAO) recently reported that no strategy for improving federal information security has been articulated clearly. In the absence of a coordinated, government-wide plan, the U.S. response to the threat may be "unfocused, inefficient and ineffective," wrote Jeffrey Steinhoff, the acting assistant comptroller general.

He said the Year 2000 technology challenge could be viewed as a major test of U.S. ability to protect computer-supported critical infrastructures.

## Say It Isn't So!

This year's recipient of the Lifetime Achievement Award granted by the Personal Communications Industry Association (PCIA) is none other than Rep. Billy Tauzin, chair-

man of the House Telecommunications Subcommittee and sponsor of several anti-scanner bills. Is anyone surprised?

## Iowa Hard on the Hobby?

Speaking of bills, Iowa is the latest state to pass legislation which appears to make it a felony to listen to almost anything other than a broadcast. The wording, though similar to federal legislation, appears to omit the substantial exceptions made in federal law – maritime, aeronautical, governmental, law enforcement, public safety, private land mobile, amateur, citizens band, general mobile radio services, etc.

Reckon they passed the law to pacify all those politicians stumping for president in their state? It wasn't until politicians started being overheard talking on their cellphones that such legislation became an issue.

## Telephone Comes to the Sierras

Kennedy Meadows, Calif., finally got phone service, 123 years after it was invented and four years after California utilities commission approved it for the community. The first phone call was made by Jan Gant, co-owner of Grumpy Bear's Tavern. She got an answering machine on the other end.

Contributor Doug Robertson commented, "No official word yet whether they have radio, a later invention!"

## Decisions from the Hill

- The Federal Communications Commission has set the standards for locating cellular 911 calls, and the technology is to be in place in two years. Although companies have a choice of technologies, the infrastructure must be in place and carriers must make a reasonable effort to provide access to the technology by December 31, 2004.
- The FCC has eased rules on the number of cable customers a single company can serve, and relaxed the cap on percentage of total cable households a single company can serve. Chairman Bill Kennard hopes the move will enable faster entry of cable companies into new markets of high speed internet access and local telephone service.
- Over the objections of the Justice Department, the White House has agreed to allow U.S. companies to sell data-scrambling technology overseas with virtually no restrictions. Companies must still seek permission to sell to a foreign government or military, and the sale to seven countries accused of terrorism is banned.

To salve the concerns of the law enforce-

ment, the White House has promised to ask Congress to give the FBI \$80 million to develop techniques to break the encryption!

## Phase 3D Accepted for "First Suitable" Ariane 5 Launch

AMSAT-NA says the Phase 3 Amateur Radio satellite has been accepted as a payload for the "first suitable" Arianespace Ariane 5 vehicle launch. The announcement came today from Phase 3D Project Leader and AMSAT-Germany President Karl Meinzer, DJ4ZC, who said a launch opportunity could come during the first half of next year.

Meinzer said in a statement from Marburg, Germany. "From the very beginning of the Phase 3D project, we considered the Ariane 5 series our primary launch vehicle. Our long history of success and mutual cooperation with both the European Space Agency and Arianespace, coupled with our need to lift P3D into a high geostationary transfer orbit, made the Ariane 5 the unanimous choice by AMSAT."

## Seti Success

According to [www.setiathome.ssl.berkeley.edu](http://www.setiathome.ssl.berkeley.edu), 1.2 million volunteers from 224 countries have provided more than 83,000 years' worth of computing time in this particular Search for Extraterrestrial Intelligence, which operates as a screen saver on home computers.

## DX the Burrowing Owl

Hobbyists are being asked to assist wildlife researchers track the movements of endangered burrowing owls as they migrate southward from Canada. Scientists think that they fly all the way from Saskatchewan and Alberta to southern Texas and northern Mexico.

Since the birds remain in or near underground burrows during the day, monitors are most likely to copy the short-pulsed signals during hours of darkness, when the birds are migrating and foraging. All that's needed is a scanner or an extended-range hand-held plus an outside antenna for 172 MHz.

For more information, check the burrowing owl page at <http://members.aol.com/homingin/>. The page contains the exact frequencies of all 48 tag transmitters plus photos, information on the expected migra-



tion path, and suggestions for simple monitoring and tracking gear.

## New Head for CBC

Prime Minister Chretien has appointed Montreal businessman Robert Rabinovitch as the new president of the CBC. Rabinovitch, 56, will head the public broadcaster for the next five years and succeeds Perrin Beatty. Beatty's mandate technically expired in March, and his replacement has been the subject of heated speculation for almost a year. Rabinovitch has been offered the position of CBC president before, but has always turned it down. Heritage Minister Sheila Copps, who lobbied hard for the appointment of Rabinovitch, says she is pleased with the announcement.

## Shortwave Listener Survey

In conjunction with Radio Canada International's Maple Leaf Mailbag, the Canadian International DX Club announces the Second Annual CIDX Shortwave Listener Survey. Listeners worldwide are invited to send in their choice of favorites by January 31, 2000. The results will be announced on the Maple Leaf Mailbag show on Radio Canada International in the February 13-14, 2000 airings of the program. See p. 38 for details.

## Radio Pioneers RIP

• Anker Peterson informed the shortwave listening community of the loss of Jens Frost, who suddenly passed away in October. Jens would have been 80 years in December. He was Assistant Editor of *World Radio TV Handbook* in 1961-1963, Editor-in-Chief 1964-1986 and Editor Emeritus 1987-1999.

Larry Magne said, "I worked in Philadelphia with Jens for several years when he was the *WRTH* editor... He found and nourished the finest attributes of each person so that we all became better for having known him."

• Jean Shepherd, the prolific radio raconteur whose easy storytelling style earned comparisons to fellow Midwesterner Mark Twain, also passed away in October. He was 78.

Shepherd, once described by media critic Marshall McLuhan as "the first radio novelist," spent 21 years on 50,000-watt WOR-AM in New York City, attracting a large, loyal following along the Eastern seaboard. He worked without a script, conjuring tales based on his Indiana upbringing in his hypnotic voice.

• One of the first women in the nation to own a radio station passed away in July. Toni Brady and two other employees bought WABY, Albany, NY, in the late 40s. She became general manager and took the station to number one in an era when radio was strictly a man's world. She had the courage to adopt a rock 'n roll format in 1952, two years before Elvis Presley's first release, and to hire black broadcasters. Brady sold the station in 1970.

*"Communications" is compiled by editor Rachel Baughn, from news clippings sent or emailed by our readers. This month's contributors: Anonymous, Ballston Spa, NY; Chanel Cordell, Blairsville, GA; Roger Cravens, Atlanta, GA; Sheldon Daitch, email; Bob Grove, Brasstown, NC; Ken Hydeman, Xenia, OH; Rob Kissel, Swartz Creek, MI; Michael Kuentz, Waterford, MI; Gordon Levine, Anaheim, CA; Larry Magne, PA; Fred Maia, W5YI; William McConnell, Clover, SC; Doug Robertson, Oxnard, CA; Ed Schwartz, Chicago, IL; Harold Sellers, ODXA; Larry Van Horn, Brasstown, NC*



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# TUNING IN TO THE POWER GRID

## New Year's Eve 1999 Bash or bust?

By Larry Van Horn, N5FPW  
*Monitoring Times* Assistant Editor

**T**here you are, enjoying your New Year's Eve party or watching the Big Apple drop in Times Square as the midnight bewitching hour approaches. Suddenly, as the clock rolls past midnight into January 1, 2000, the lights go out. ... What happened?! And where can you tune your scanner to find out what's going on?

Your New Year celebration has been spoiled by what is known in computer geek-speak as the "Y2k computer century bug." No, not the "millennium bug" as misreported by the media. The new millennium actually starts on January 1, 2001. This problem is related to entering a new century.

Is it fact or fantasy? We'll all know definitively in less than a month the outcome of this major, worldwide event.

You may be sure that while you joyously celebrate the New Year, behind the scenes U.S. government agencies, military services, and various sectors of the nation's business community will all be on full alert for problems caused by this infamous computer glitch. Probably

no single event in recent history has had more written about it, money spent on it, and people worried about it than the Y2k computer crisis.

### A Short Recap

The Y2k (year 2000) problem stems from the fact that millions of electronic devices were programmed to process only the last two digits of a year, assuming that the first two would be 1 and 9. That convention was first adopted as a cost-saving measure decades ago when computer memory and disk storage was at a premium and every character counted. Later on, many programmers continued to use the two-digit date shortcut through force of habit. When the new year arrives, however, those machines will understand the year "00" not as 2000, but 1900 in their calculations, potentially causing them to shut down or stop working properly.

The largest concern of Y2k crisis theorists are the nation's utilities: the electrical power grid, telephone, water and sewer services. These

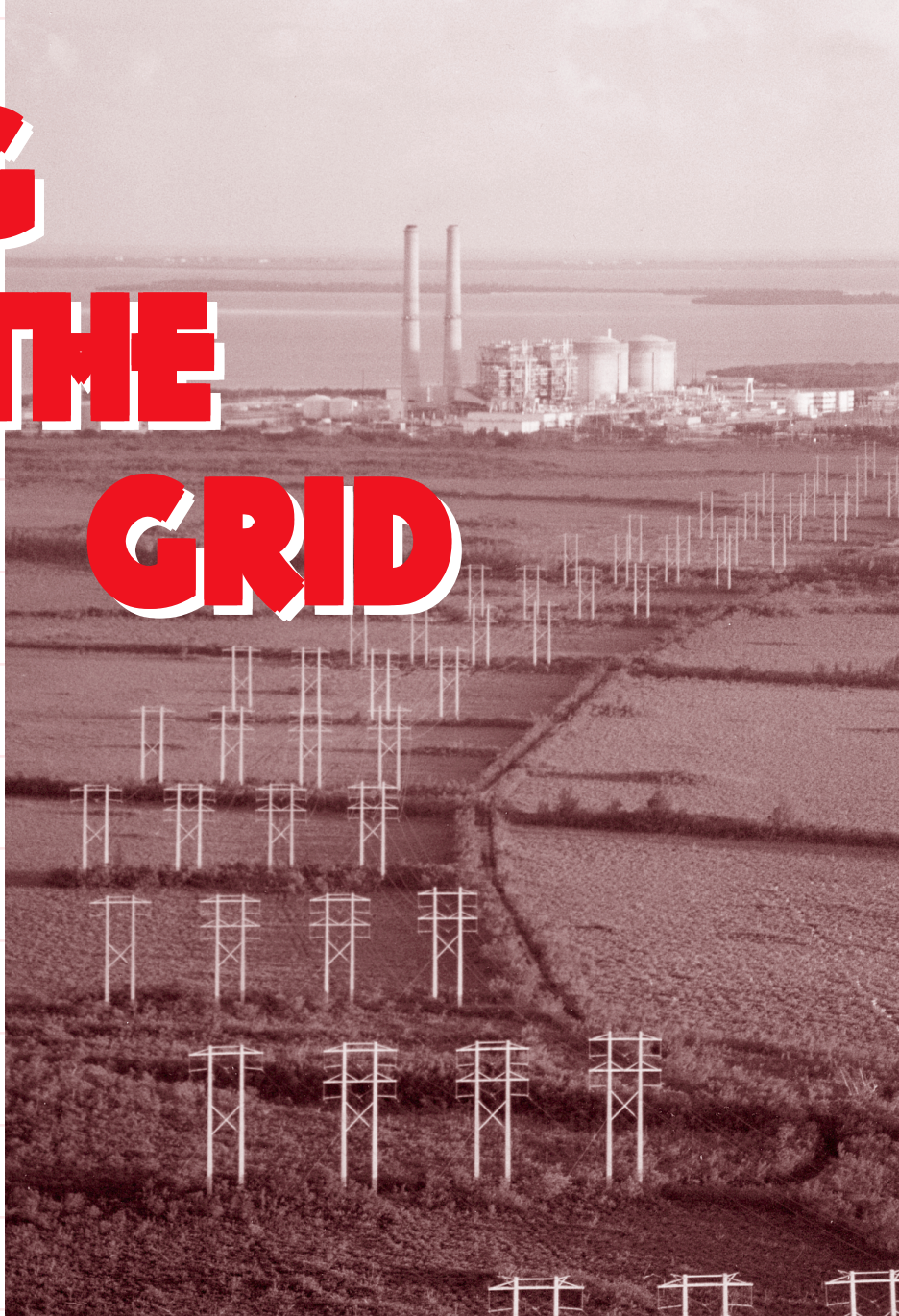


Photo by Robert Wyman; aircraft courtesy Aerials, Inc., Miami, FL

public services make extensive use of computer systems, and if any or all of these big four get bit at midnight on New Year's Eve, you can count on it being a long, long night for all parties involved. That also means lots of fascinating radio communications on a local, national and worldwide scale.

## The Power Grid is the Weakest Link

Power failures are probably going to cause the majority of Y2k problems, though in developed countries like the United States they will likely be short-term and localized. Unfortunately, since electricity is so critical to virtually all aspects of modern society, power failures will also be the biggest wild-card in determining how widespread other problems will be.

The U.S. nuclear power industry is confident that there will be no Y2k related problems, despite only 68 of 103 plants currently being compliant as *MT* goes to press

The electric systems of North America are connected within four large Interconnections. The largest, the Eastern Interconnection, covers the eastern two-thirds of North America, including the United States and Canada. The second largest, the Western Interconnection, covers the western one-third of the U.S. and Canada, as well as a portion of the Baja California Norte region of Mexico.

The other two Interconnections include 1) most of the state of Texas, also known as the ERCOT Region and 2) the Quebec Interconnection, which covers the province of Quebec, Canada.

Each of these four Interconnections is a highly integrated network (using computers) into the local utility systems they serve. A major disturbance within one part of an Interconnection will rapidly have an impact throughout the Interconnection and has the potential to cascade the effect to the entire Interconnection.

The four Interconnections are for the most part independent from each other, because they are connected by comparatively small, high voltage direct current (HVDC) electrical ties and do not interconnect synchronously.

The one notable exception is the major HVDC tie lines from Hydro-Quebec into the Northeastern United States. Loss of these facilities and the power supply from Quebec can have a substantial impact on power delivery systems in the Northeastern portion of the United States.

Within each Interconnection, power production and delivery systems are highly interdependent. In general, systems are operated such that the loss of one facility, or in some cases two or three facilities, will not cause cascading outages. Y2k poses the threat that a shutdown of several utilities that are part of a particular Interconnection may result in stressing the electric system to the point of a cascading outage over a large area.

To put this in a nutshell, your individual electric utility that invested tens of millions of dollars in solving Y2k problems could be affected in a major way by an outage initiated in neighboring systems that have not been as diligent. The experts now predict that there will be power failures worldwide. The severity will range from mild to severe, but emergency systems already in place for natural disasters and unanticipated catastrophes will help mitigate many problems.

Of course, if the power grid or local electric utilities go offline New Year's Eve, that could have an immediate effect on other local services such as telephone, water and sewage. These other public services could also have their own Y2k issues if the bug bites them.

## It's not over on January 1

Don't assume we're out of the woods if everything goes well at midnight, January 1, 2000, either. There are two more critical periods that concern planners.

January 3, 2000, is Monday, the first full business and banking day after the rollover. Most companies and institutions will have had teams working through the New Year weekend resolving unforeseen problems.

But Monday represents the first real-world stress test of critical business systems. The 6:00 to 7:00 a.m. hour on January 3 will tell the tale if this date is to be a problem.

Another date that has planners concerned is the transition into and out of February 29, 2000 (leap year date). Not only is 2000 a leap year, it is a leap *century* – the first since Shakespearean times. Did programmers remember it? If everything goes well around the New Year, then this bodes well for the leap year date as well. If not ...

## Where to Monitor the Action

So where can you tune in to monitor what is happening New Year's Eve?

The bulk of the Y2k emergency communications associated with the nation's power grid will be conducted via telephone (landline) hotlines. Satellite based communications between field units and North American Electric Reliability Council/Department of Energy Emergency Operations Center (NERC/DOE EOC) Y2k Information Center will be conducted using the MSAT communication satellite. This geostationary satellite operates at 106.5 degrees west, uses the L-band frequencies and digital communications systems.

The NERC/DOE EOC will start concentrated operations commencing December 29, 1999, at 1300 EST until January 4, 2000, at

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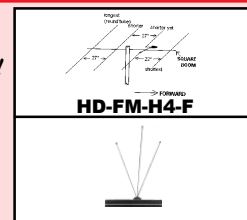


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1430 EST. They will also establish an HF interface with the National Coordination Center for Telecommunications (NCC). Watch the HF frequencies (USB) 5236.0, 10586.5, 14396.5, and 18392.0 kHz. for activity. Additional HF frequencies that will be used are covered in this month's *Fed File* and *Utility World* columns.

Your best bet for Y2k comms New Year's Eve is to monitor your local and nearby power utility companies. Table one is a detailed list of power/water service frequencies allocated to utility companies in the VHF/UHF land mobile spectrum here in the United States.

While the power companies are a wildcard when it comes to being Y2k compliant, telecommunications systems have consistently passed worldwide Y2k compliance tests, and appear to be one of the major systems we can count on using when the new year arrives. But just in case, table two is a list of telephone company frequencies in the VHF/UHF spectrum.

Unless you have thoroughly examined and cataloged your local RF spectrum, I highly recommend you take some time now and program the frequencies we have provided in tables one and two into your scanner. You will need some time to find the active frequencies in your area and identify their users.

Some utility companies, such as the Southern Company



(SouthernLine 800 MHz comm system) use a digital trunking system, so monitoring their communications will be impossible. Still other utilities use analog trunking systems in the 800 MHz range, but with the current generation of trunk tracking scanners following the action will be relatively simple.

Not all public utilities are owned by private companies. Some utilities are owned by the local government and, yes, even the federal government. If your local government provides utility services, a search through the public safety portion of the bands or scanning any of the local government (PL) channels listed in Gene Hughes' *Police Call* should turn up their communications systems.

Speaking of public safety frequencies, don't forget to include local police, fire, and ambulance frequencies into your scanner frequency cocktail. Some of the most fascinating and interesting listening to these action packed frequencies occurs on New Year's Eve.

### The Feds Own a Power Company

Here in the eastern part of the United States, portions of seven eastern states get their electrical power from a government-run power

**TABLE ONE: POWER/WATER SERVICE FREQUENCIES**

**Base or mobile assignments**

37.46 37.48 37.50 37.52 37.54 37.56 37.58 37.62 37.64 37.66 37.68 37.70 37.72 37.74 37.76 37.78 37.80 37.82  
37.60 37.84 37.86 37.88 37.90 37.92 37.94 37.96 37.98 38.00 38.02 38.04 38.06 38.08 38.10 38.12 38.14 38.16 38.18 38.20 38.22 38.24 38.26 38.28 38.30 38.32 38.34 38.36 38.38  
48.04 48.06 48.08 48.10 48.12 48.14 48.16 48.18 48.20 48.22 48.24 48.26 48.28 48.30 48.32 48.34 48.36 48.38  
48.40 48.42 48.44 48.46 48.48 48.50 48.52 48.54 153.410 153.470 153.530 153.590 153.650 153.695 153.710  
153.725 158.130 158.190 158.250 451.025 451.050 451.075 451.100 451.125 451.150 451.175 451.200 451.225  
451.250 451.275 451.2875 451.3625 451.375 451.3875 451.4125 451.425 451.4375 451.4625 451.475 451.4875  
451.5125 451.525 451.5375 451.5625 451.575 451.5875 451.6125 451.625 451.6375 451.6625 451.675 451.6875  
462.4625 462.475 462.4875 462.5125 462.525

**Base, mobile, or operational fixed assignments (Interconnected or coordinated utility system)**

47.92 47.94

**Base or mobile assignments (bandwidth not to exceed 6 kHz)**

158.1225 451.01875 451.03125 451.04375 451.05625  
451.06875 451.08125 451.09375 451.10625 451.11875  
451.13125 451.14375 451.15625 451.16875 451.20625  
451.21875 451.25625 451.26875

**Base or mobile assignments (bandwidth not to exceed 11.25 kHz)**

153.4175 153.4775 153.5375 153.5975 153.6575  
153.7025 153.7175 153.7325 158.1375 158.1975  
158.2575 451.0375 451.0625 451.0875 451.1125  
451.1375 451.1625 451.2125 451.2625

**TABLE TWO: TELEPHONE SERVICE FREQUENCIES**

35.16 43.16 151.985 158.340 451.1625 451.175  
451.1875 451.2125 451.225 451.2375 451.2625 451.275  
451.2875 451.300 451.3125 451.325 451.3375 451.350  
451.3625 451.375 451.3875 451.400 451.4125 451.425  
451.4375 451.450 451.4625 451.475 451.4875 451.500  
451.5125 451.525 451.5375 451.5625 451.575 451.5875  
451.6125 451.625 451.6375 451.6625 451.675 451.6875  
462.4625 462.475 462.4875 462.5125 462.525



*Y2k emergency communications associated with the power grid will be by landline telephone and via satellite using the MSAT system (pictured).*

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Use this powerful, dual-trunking, hand-held scanner to track up to 1000 channels in 20 banks—conventional communications, Motorola (I, II, I/II hybrid), or GE/Ericsson (EDACS). Extended frequency coverage of the **PRO-94** includes 29-54, 108-174, 216-225, 406-512, 806-960 (less cellular), and 1240-1300 MHz!

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ANT 30	Magnetic mount Stealth antenna	\$34.95

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web: [www.grove-ent.com](http://www.grove-ent.com); e-mail: [order@grove-ent.com](mailto:order@grove-ent.com)





are in their scanners New Year's Eve.

On the positive side, TVA notified the North American Electric Reliability Council on July 7, 1999, and the Nuclear Regulatory Commission on June 29, 1999, that the TVA systems used to produce and deliver power are Year 2000 ready.

So it's time to get busy and get ready for Y2k. The time to start mapping out your local radio spectrum is right now, before this major event takes place. To help you in this search, in addition to this article you should get a current copy of *Police Call*, the Grove FCC CD-ROM, or the book *Monitor America*. All these publications will be useful in mapping the radio terrain. All of these publications are available from Grove Enterprises at 1-800-438-8155.

Progress toward eliminating the Y2k problem has been substantial. As we get closer to the new year, more and more safeguards will be put into place, but count on the media to increasingly hype the remaining risks. So brace yourself for information overload on the subject.

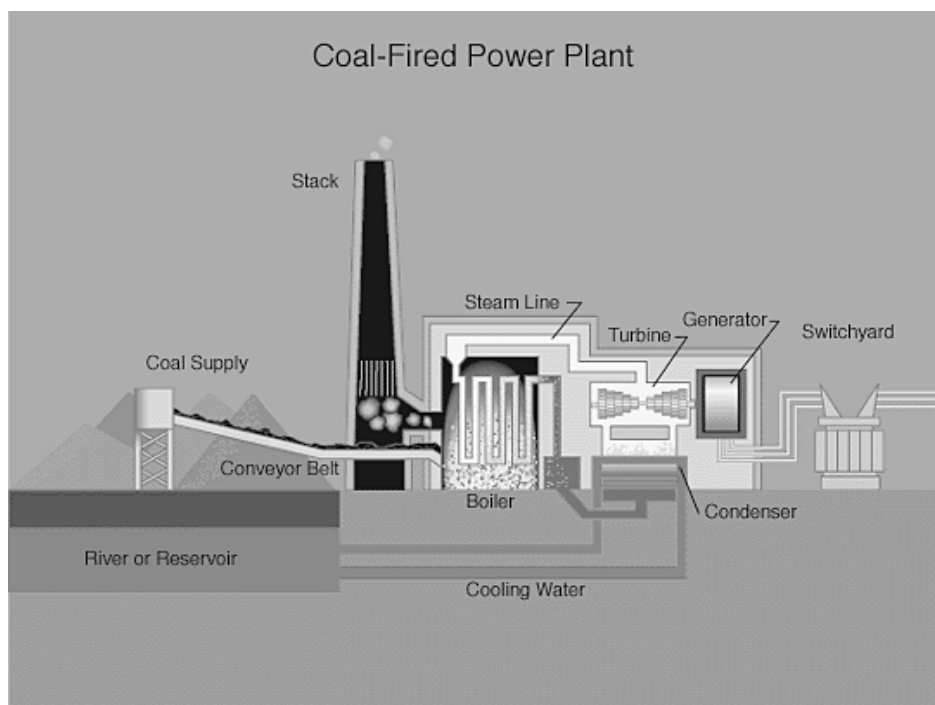
On the other hand, the vastness of the Y2k problem virtually assures some disruption, and if you are equipped with a scanner and shortwave radio, the right frequencies, and a willingness to turn the dials for a few hours, you might well have a New Year's Eve party you will long remember.

company known as the Tennessee Valley Authority (TVA). TVA is the nation's largest wholesaler of electricity and serves some 8 million people over 17,000 miles of transmission lines.

The TVA is a regional federal corporation that was created by Congress. In a message to Congress on April 10, 1933, Roosevelt said, "I, therefore, suggest to the Congress legislation to create a Tennessee Valley Authority - a corporation clothed with the power of government, but possessed of the flexibility and initiative of private enterprise. It should be charged with the broadest duty of planning for the proper use, conservation and development of the natural resources of the Tennessee River drainage basin and its adjoining territory for the general social and economic welfare of the nation..." The bill, signed by the President on May 18, 1933, created the Tennessee Valley Authority.

The TVA system consists of 11 coal-fired plants, 29 hydroelectric plants, 1 pump-storage plant, and 3 nuclear power plants, a very impressive array of hardware. All that hardware requires an extensive radio communications system to guard, operate and maintain its power generating capability.

Table three has the most extensive look at the TVA communications system to date. *MT* readers is the southern states served by the TVA will want to make sure these frequencies



Courtesy of TVA

**TABLE THREE: TENNESSEE VALLEY AUTHORITY FREQUENCIES**
**VHF low band**

Construction Support	40.50 40.57 40.74 40.87
Law Enforcement (Security and Safety)	38.97 38.98
Low Power Simplex Operations	38.99 40.01 40.03 40.61 40.63 40.73 40.75 40.85 40.87
Operations/Maintenance	40.62/40.74
Transmission and Customer Service (TCS)/Local Area Systems	40.53 40.65 40.69 40.77 40.83
Transmission and Customer Service (TCS)/Wide Area Emergency Service	40.43 40.49 40.57 40.61 40.73 40.85

**VHF high band/UHF (all freqs are simplex unless otherwise indicated)**

Air Quality Monitoring System	172.425/171.650
Construction Crane Operation	411.625 411.875 412.000 412.025 412.125 412.250 412.300 412.375 417.725 417.975
Construction Service Branch	163.050 163.100 164.475 171.700 411.350 417.425/ 411.950
Construction Management	166.325/172.750
Emergency Alerting	408.625/415.025 409.300 412.075 414.875/419.925 415.025/419.625 416.075/419.675
Energy Demo	163.100
Facility Management/Fire Brigade	417.675/411.650
Field Test Operations	163.125 163.150 163.175 170.025
Flood Gate Control	409.450/419.150 411.550/415.450
GOES TVA Data Collection System	401.713 (Ch 9) 401.716 (Ch 11) 401.722 (Ch 15) 401.755 (Ch 37) 401.806 (Ch 71) 401.872 (Ch 115)
Hydrologic data	169.425/171.825 171.850/169.500 406.125/412.625 412.675 412.775
In Plant Repeater system (nuclear sites)	173.050/164.250 (routine/emergency maintenance)
In Plant Transportable Repeater System	172.025/162.025 (for emergency maintenance/operations)
Law Enforcement Miscellaneous	155.475 168.225/171.750 409.450/415.450 417.850/ 411.725 415.075/419.875 417.725 417.975
Law Enforcement (nuclear power plants)	171.3875/163.375 172.450/164.750 166.250/173.7625
Load Drop Receivers (Load Management)	170.050 (system wide)
Low Power/Authorized throughout TVA System	163.100 163.125 163.150 163.175 164.250 166.275 166.325 166.375 166.825 166.875 167.025 167.075 167.100 167.125 167.150 168.325 168.350 170.025 411.825 415.075 418.050 418.075 418.575 419.875 156.350 156.450 156.500 156.550 156.600 156.650 156.700 156.800 156.975 157.025 157.125
Marine (VHF) Frequencies	163.050 166.250/173.7625 166.325/172.750 166.375 168.575/166.6375 166.825 166.875 167.025 167.100 167.125 167.175 168.325 168.475 169.400 170.150 172.650/171.650 171.750 172.575 408.050 408.400 408.425 408.575 411.350 411.450 411.550 411.700 411.825 412.000 412.250 414.975/419.775 418.075 406.475 406.550/416.475
Miscellaneous Allocations	406.375/411.525 408.575/411.675 172.575/164.725 419.950 419.975/414.825 (system wide) 167.175 417.925/412.350 166.225 172.425 (System wide) 411.700 417.650/411.450 411.450/417.650 173.050/164.250 168.275/164.575 (Hydro Plants) 170.025/163.125 172.625/163.150 170.075/163.175 409.450/415.450 411.550/419.150 417.850/411.725 411.950/417.425
Miscellaneous Data Networks	163.050 170.025/163.125 172.625/163.150 170.075/ 163.175
Muscle Shoals Power Service Shops	166.275 166.375 411.650
Nashville Area Office	163.3937 163.7937 165.8062 167.8062
Nuclear Power Plant Refueling Net	169.725 (paired with VHF low band assignments)
Power Plant Contingency Network	408.625/416.425 409.975/416.000 411.575/419.650 419.650/411.575 411.775/417.775 417.775/411.775 411.825/417.825 417.825/411.825
Routine/Emergency Maintenance (nuclear plants)	
Ocoee Hydro Plants	
One-Way Paging System	
Operations/Maintenance (UHF)	
Plant Maintenance/Operations	
Power Facility Operations/Control/Maintenance	
Power Transmission System Ops/Maintenance	
Railroad Yard Operations	
Seismic telemetry sensors	
Transmission and Customer Service (TCS)	
Transmission and Customer Service (UHF TCS)	



# Around the World By Radio

By Dave White

**N**ew Year's Eve 1999 promises to be one of the most celebrated in our lifetimes, as it signals the dawn of a new century.

Thanks to the geography of the Earth and the physics of the ionosphere, SWLs are in a unique position to witness the arrival of Y2k over and over again, as the clock strikes midnight in each of the world's 24 time zones.

To be sure, the cable news networks will fill their programs with live shots from various spots throughout the world as the new year dawns, but where's the challenge and adventure in turning on the TV and punching buttons on the remote control?

With a little advance planning and perseverance – and possibly the aid of a tape recorder and/or computer – you can stage an all-day, all-night DX party that will make your celebration memorable, without causing a hangover!

You don't need a lot of expensive equipment or special antennas for this party. If a target station is going to be heard at all, it can most likely be heard with the equipment you normally use, whether that's a modest portable or a high end tabletop rig.

If you decide to give this exercise a try,

remember that it's just for fun. Don't get discouraged if you miss a target, need to catch a few hours' sleep, or don't have the requisite timers and equipment for recording. And let's not get too picky about which time zone a station's transmitter is located in, or which Southern Hemisphere countries are observing Daylight Savings Time.

Whether you qualify as a serious or casual DXer, you'll be a witness to history from a unique perspective, and may even bag some new stations or countries for your log in the bargain!

## WHAT TO EXPECT

Not all stations will be broadcasting in English at the time their clocks strike midnight, but you should be able to make a pretty fair guess as to whether the language you're hearing is spoken in the country you're trying to hear. Even in a foreign language, you can probably confirm your catch if you can hear a station ID.

Some broadcasters are planning special programming to mark the occasion, others are not. Radio Latvia's Head of International Relations, Aviars Ginters, for example, says, "We do not really plan anything special for

the beginning of the year since 2000 is nothing but the last year of this millennium. Rather, we'd consider the end of 2000 and January 1, 2001, as an important occasion."

Consider it a successful catch just to hear the target location at the instant the New Year dawns, even if it isn't in a language you understand, and isn't accompanied by cheers, fireworks, and popping champagne corks.

In simplest terms, when Saturday, January 1, 2000, dawns for the first time (in the middle of the Pacific Ocean and extreme eastern Russia) it will be 1100 UTC on the morning of Friday, December 31, 1999. That's before dawn Friday in North America, so plan to get up early that morning if you want to catch the action at the very beginning.

Unless you're able and willing to stay awake for 24 hours straight, you'll either need to arrange to try and record some of your targets, or be content to miss a few while you sleep.

The optimum arrangement would be a receiver with multiple timers and the circuitry to activate a tape recorder, in order to record different frequencies at different times while unattended. If you're not so equipped, you might be able to catch a particular target

of interest by leaving your radio on, tuned to the target frequency, and feeding the output to a tape deck that has a timer. VCRs are great for this, but be aware that some VCRs also require a video signal in order to record the necessary control track on the tape.

If you use a computer in conjunction with your monitoring, there are programs available that will digitize the audio from your radio, via the computer's sound card, and store it on your hard drive for later listening.

At this time of year, and with the sunspot cycle approaching maximum, conditions should be quite good, but there are few certainties in life, so don't be surprised if some target stations simply can't be heard in your location. In those cases, you might try hearing what can be heard in other parts of the world by way of a web-controlled radio—one that you control remotely by way of an Internet connection (see Table 2). If you plan to use

these resources, you should spend a little time practicing ahead of time. You might even ask a site's owner to add particular stations to the radio's presets.

In some of the locations of interest, there is no shortwave service, but some local stations "broadcast" on the Web. Unless you're an absolute radio purist, you can catch some of the action on your computer that your radio can't hear. A complete list of Web broadcasters is well beyond the scope of this article. You can find comprehensive directories at <http://www.web-radio.com> and <http://dialspace.dial.pipex.com/town/place/abn39/ra.htm>.

You may want to try a few practice runs before the "big day," just to get a feel for which countries you can actually hear in your location at the stations' local midnight. This will help you plan when to be "at the dials" and when you can safely catch a few winks.

MT's *English Language Shortwave Guide* and Glenn Hauser's *Global Forum* column are essential sources for the latest schedules and program information available at press time. The "Blue Pages" in the latest *Passport to World Band Radio* and *World Radio TV Handbook's* "SW Stations of the World" section are useful in identifying foreign language stations.

## WHO'S ON FIRST?

(All times UTC, starting Friday, December 31; frequencies in kHz)

**1100** – Both Tonga and Fiji in the South Pacific claim to being the first place in the world to see each new day. Unfortunately, neither currently has a shortwave service. Fiji's NAU-FM can be heard in Real Audio on the Web. Although it's considerably further west, the fact that New Zealand observes Daylight Savings Time at this time of year makes it local midnight there, too. Radio New Zealand International has usually signed off of 9700 by this time, but may extend their schedule on New Year's Eve. If not, RNZI can also be heard on the Web.

**1200** – Your best hope at this hour is Kamchatka Radio in Petropavlovsk in far eastern Russia. Although it's a domestic service, its 100,000 watts on 4485 should give you a decent chance of hearing its Russian language broadcast. Back in the South Pacific, the low power domestic service on Vanuatu (4960 and 7260) is normally silent at this hour, but it can't hurt to try.

**1300** – Things start to pick up as the clock strikes twelve in eastern Australia. 9580 is probably best at this hour in North America. Another powerful Russian domestic, Magadan Radio, is usually active on 7320 at this hour. For a real challenge, you could see if the domestic service in the Solomon Islands on 5020 is broadcasting past its normal sign-off.

**1400** – Check back with Radio Australia as the central part of the country moves into the New Year. You can most likely catch the religious broadcasts from KSDA in Guam on 13720 and KFBS in Saipan on 9670. Papua New Guinea's NBC domestic service on 4890 might still be audible on the West Coast at this hour.

**1500** – Radio Japan's 9505 broadcast to North America is the place to start as the new day comes to Southeast Asia. Radio Pyongyang's signals on 11735 and 13650 to Central and South America might let you hear how North Korea welcomes Y2k. It's still fair to check in on Radio Australia, too,

### TABLE 1: PARTY PLANS

Some International Broadcasters will ring in the new millennium with a bang; others will be "business as usual." Here's a sampling of some preliminary plans:

**Radio Mexico International** – "Probably we'll do something like a live coverage from some special site in Mexico City where the celebration is expected to be unique and quite amusing," says Alejandro Esteinou, Chief of the English Department.

**Radio Slovakia International** – English Section head Helga Dingova says, "We will be preparing something very special. The New Year's Eve has always been an occasion for us to prepare something special, not to speak about the last year of the century."

**RTE, Ireland**, plans extensive programming to celebrate. Producer Peter Feeney has been working all year on RTE's Millennium Project.

**Radio Free Europe / Radio Liberty** – "We are working on a special millennium program."

**Voice of Russia** – Elena Frolovskaya of VOR's World Service: "Of course there'll be a special program, or programs, on the New Year eve of 2000."

**WRMI, Miami** – "We did a special Viva Miami program on New Year's Eve this past year," according to WRMI's Jeff White. "At this point I plan to do another one at the end of this year."

**WWCR, Nashville** – Head of Operations, Adam Lock, Sr. reports, "We are considering doing Y2k updates from around the world, via live telephone feed, for New Year's Eve. It is our intent to let the SW audience know whether things are still functioning properly after midnight."

### TABLE 2: WEB-CONTROLLED RADIOS

Computers and radios are becoming increasingly intertwined, no more so than in the case of radios that you can control via the Internet. Several generous hobbyists have made their radios available via the Web, and welcome any and all that wish to use them. Please observe a few simple rules of "netiquette" if you plan to use these radios.

- Don't be a "hog." These facilities are available for all to use, so remember there will likely be others who want to use them at the same time you do.
- Watch and listen before taking control of the radio. If the site has a chat mode, ask the others who are connected before changing the frequency.
- To minimize the time you need to spend, plan ahead for the stations and frequencies you want to try, rather than just casually tuning to hear what there is to hear.

Web Address	Location	Facilities	Host
<a href="http://www.ralabs.com">http://www.ralabs.com</a>	Conastota, NY	TenTec RX320 Kachina 505DSP 120' dipole up 40'	Random Access Labs Bob Arnold, N2JEU arnoldr@ralabs.com
<a href="http://www.chilton.com">http://www.chilton.com</a>	Reston, VA	Drake R8 60' attic loop	Jeff Chilton, KM4QH jwc@chilton.com
<a href="http://www.pejla.nu">http://www.pejla.nu</a>	Umea, Sweden	Icom PCR-1000 SRT CR-99 Spectrum Analyzer	Mikrocentrum AB Mikael Kostet, SM2KOT monitor@mcab.se
<a href="http://www.javaradio.com">http://www.javaradio.com</a>	Stockholm, Sweden	Icom PCR-1000 MK-5 discone	Kjell Lindman, SM0NHC webmaster@javaradio.com



as it reaches midnight in the continent's Northern Territory.

**1600** – The new day is moving into more densely populated areas now. At this hour, China Radio International's English language service is beamed toward Africa. Try 9565 and 9620, and remember that this is NOT the Chinese New Year. Try the many frequencies on which Voice of Russia is aimed at the Middle East. You have one more shot at Radio Australia, as the western part of the continent enters year 2000. For those in the Western U.S., it's still early enough to make Radio Malaysia's domestic service on 7295 worth a shot.

**1700** – Voice of Russia is still beaming English to the Middle East. Voice of Vietnam on 9840 is beamed to Europe, and is in Vietnamese.

**1800** – Try 7185 and 9550 for Radio Bangladesh's English service to Europe. Voice of Russia is now beaming English to Europe and Africa so try again as another of Russia's 11 time zones enters the New Year.

**1900** – India's time zone is actually UTC +5-1/2 hours, but remember we're not being overly picky. All India Radio is in English on 11935 and 13780.

**2000** – You can probably catch Radio Dubai from the United Arab Emirates on 13675 as day dawns in the Middle East. The broadcast will most likely be in Arabic, so it won't be hard to identify.

**2100** – Radio Kuwait on 9855 should be an easy catch, also in Arabic. Wait until 2130 for English broadcasts from Voice of Armenia on 9965 and Iran's VOIRI on 6175.

**2200** – Radio Damascus, Syria, is a likely target on 13610, as is Radio Bulgaria on 7535. At 2240, Greece should be audible beaming to Australia on 9425.

**2300** – A good chunk of Africa is moving into the new century at this hour, along with much of Europe. You'll probably have to dig deep to catch domestic signals from the Afri-

cans. Check MT's *Shortwave Guide* for the major European external services from Austria, Belgium, Denmark, France, Germany, Netherlands, Hungary, Norway, Spain, Sweden, Switzerland and Vatican City.

**0000** – Big Ben rings in the New Year at "zero hours Greenwich Mean Time" on The Beeb. BBC World Service is beamed to the Americas on several frequencies in the 49, 31 and 25 meter bands. Western Africa also welcomes the New Year, so you can try the domestics from Burkina Faso, Ivory Coast, Ghana and Mali.

**0100** – Most of this time zone is in the middle of the Atlantic Ocean, but that includes Brazil's Atlantic islands. Radiobras beams Portuguese to North America on 11780 beginning at 0115.

**0200** – The new day continues to cross Brazil. Listen for native language broadcasts, particularly in the 25 and 49 meter bands, where Brazilian domestic stations can frequently be heard. The sounds of celebrating the New Year will be obvious, even if you don't speak the language!

**0300** – Argentina, Chile, Uruguay and Paraguay join the ranks of South Americans ticking into 2000. Once again, try the domestic signals, especially between 4800 and 5100. Up north, the eastern reaches of Canada are celebrating. Try CKZN on 6160 from St. John's at 0330 as Newfoundland enters the new millennium.

**0400** – Don't expect to hear any local celebrations on Anguilla's Caribbean Beacon on 6090, but you can at least try to hear the signal as the New Year dawns there. This would be a good time to check in on Radio Canada International, which is beaming to the Middle East on 6150, 9505 and 9645.

**0500** – It's now midnight in the Eastern Time zone in the U.S. Quebec (CBC on 9625) and Ontario (CFRX on 6070) are celebrating. Radio Havana targets North America from Cuba on 9550, 9820 and 9830. HCJB is in

English on 9745 and 12015 from Ecuador.

**0600** – RFPI should be an easy catch from Costa Rica on 6975 or 15050. Radio Mexico International is definitely worth a try on 5985 or 9705.

**0700** – The shortwave choices are starting to dwindle. Canada and Mexico are still celebrating, or you might try for some BCB signals from the Mountain Time zone in the U.S.

**0800** – Try CKZU from Vancouver on 6160 to wrap up things from Canada. BCB signals from the West Coast of the U.S. could make another interesting target.

**0900** – Alaska is virtually the only choice for this hour. KNLS normally switches from English to Russian on 7365 but "will do something special for New Year's Eve" according to Senior Producer, Mike Osborne.

**1000** – We're almost back where we started 23 hours ago! The Aleutian Islands, French Polynesia and Hawaii finally see the start of year 2000. World Harvest Radio's KWHR is beaming to Asia and the Pacific from Hawaii on 9930 and 11656. Conditions permitting, you might even hear time signals from WWVH, but don't expect to hear any partying!

## HAVE A FUN PARTY

Consider this article as a starting point, not a comprehensive guide. Customize your New Year's Eve DX Party to your own location, tastes, and family plans. Like life, this exercise is not a destination, it's a journey – so, relax and have a great trip!

.....

## ABOUT THE AUTHOR

Dave White (k4cc@k4cc.net) is a former radio-TV broadcaster turned freelance writer, desktop publisher, and computer consultant.

**TABLE 3: LOCAL MIDNIGHT AROUND THE WORLD**

UTC 1100	UTC 1200	UTC 1300	UTC 1400	UTC 1500	UTC 1600	UTC 1700	UTC 1800
EST 0600	EST 0700	EST 0800	EST 0900	EST 1000	EST 1100	EST 1200	EST 1300
CST 0500	CST 0600	CST 0700	CST 0800	CST 0900	CST 1000	CST 1100	CST 1200
MST 0400	MST 0500	MST 0600	MST 0700	MST 0800	MST 0900	MST 1000	MST 1100
PST 0300	PST 0400	PST 0500	PST 0600	PST 0700	PST 0800	PST 0900	PST 1000
Local midnight in: N. Zealand	Local midnight in: Kiribati	Local midnight in: Australia	Local midnight in: Guam	Local midnight in: Indonesia	Local midnight in: China	Local midnight in: Bhutan	Local midnight in: Bangladesh
Tonga	Vanuatu	Russia	Papua NG	Japan	Taiwan	Cambodia	Kazakhstan
Fiji	Russia	Solomon Is.	N. Mariana Is.	Korea	Indonesia	Laos	Myanmar
Russia			Australia	Palau	Malaysia	Thailand	Nepal
			Russia	Australia	Mongolia	Vietnam	Sri Lanka
				Russia	Philippines	Russia	Russia
					Australia		
					Russia		

**TABLE 3, CONTINUED**

<b>UTC 1900</b> EST 1400 CST 1300 MST 1200 PST 1100 Local midnight in: India Kyrgyzstan Maldives Pakistan Tajikistan Turkmenistan Uzbekistan Russia	<b>UTC 2100</b> EST 1600 CST 1500 MST 1400 PST 1300 Local midnight in: Armenia Azerbaijan Bahrain Eritrea Ethiopia Iran Iraq Kenya Kuwait Madagascar Qatar Russia Saudi Arabia Somalia Somaliland Tanzania Uganda Yemen	<b>UTC 2200</b> EST 1700 CST 1600 MST 1500 PST 1400 Local midnight in: Belarus Botswana Bulgaria Burundi Congo Cyprus Egypt Finland Greece Israel Jordan Latvia Lebanon Lesotho Lithuania Malawi Moldova Mozambique Namibia Romania Russia Rwanda South Africa Sudan Swaziland Syria Turkey Ukraine Zambia Zimbabwe	<b>UTC 2300</b> EST 1800 CST 1700 MST 1600 PST 1500 Local midnight in: Albania Algeria Angola Austria Belgium Benin Bosnia Cameroon C. African Rep. Chad Congo Croatia Czech Rep. Denmark Eq. Guinea France Gabon Germany Netherlands Hungary Italy Libya Malta Monaco Niger Nigeria Norway Poland Slovakia Spain Sweden Switzerland Tunisia Vatican Yugoslavia	<b>UTC 0000</b> EST 1900 CST 1800 MST 1700 PST 1600 Local midnight in: Burkina Faso Ivory Coast Ghana Guinea Iceland Ireland Liberia Mali Mauritania Morocco Portugal St. Helena Sao Tome Senegal Sierra Leone Togo UKoGBaNI
<b>UTC 2000</b> EST 1500 CST 1400 MST 1300 PST 1200 Local midnight in: Afghanistan Comoros Georgia Mauritius Oman Russia Seychelles U. Arab Em.				
<b>UTC 0100</b> EST 2000 CST 1900 MST 1800 PST 1700 Local midnight in: Brazil	<b>UTC 0200</b> EST 2100 CST 2000 MST 1900 PST 1800 Local midnight in: Brazil	<b>UTC 0300</b> EST 2200 CST 2100 MST 2000 PST 1900 Local midnight in: Antarctica Argentina Brazil Canada Chile Fr. Guiana Guyana Paraguay Suriname Uruguay	<b>UTC 0400</b> EST 2300 CST 2100 MST 2000 PST 1900 Local midnight in: Anquilla Antigua Bolivia Canada Dominican Rep. Neth. Antilles Puerto Rico Virgin Islands Venezuela	<b>UTC 0500</b> EST 0000 CST 2300 MST 2200 PST 2100 Local midnight in: Brazil Canada Colombia Cuba Ecuador Peru USA
<b>UTC 0600</b> EST 0100 CST 0000 MST 2300 PST 2200 Local midnight in: Canada Costa Rica Galapagos Guatemala Honduras Mexico Nicaragua USA	<b>UTC 0700</b> EST 0200 CST 0100 MST 0000 PST 2300 Local midnight in: Canada Mexico USA	<b>UTC 0800</b> EST 0300 CST 0200 MST 0100 PST 0000 Local midnight in: Canada Mexico USA	<b>UTC 0900</b> EST 0400 CST 0300 MST 0200 PST 0100 Local midnight in: Alaska	<b>UTC 1000</b> EST 0500 CST 0400 MST 0300 PST 0200 Local midnight in: Aleutian Islands Fr. Polynesia Hawaii

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# Filters •

## The Critical Element of any Receiver

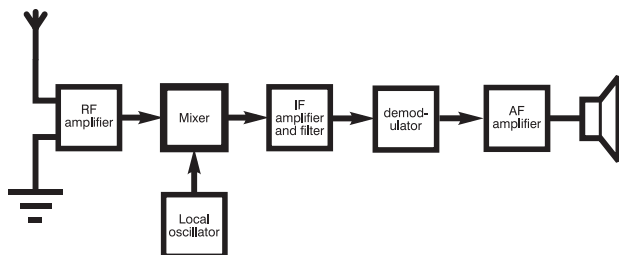
By Ian Poole G3YWX

**T**he filter is a vital element in any receiver. The two main functions of a receiver are to amplify the signals and to select the wanted one from all the other unwanted ones around it. The ability to select the wanted signal from the interference is called the selectivity and it is dependent upon the filter in the receiver. As a result, the filter performance forms a vital part of the specification for the whole receiver and literature about a set or a review of it will always contain details of its selectivity and the filter performance.

### Basic receiver

Before looking at the filter itself it is necessary to see how it fits into the receiver. One of the most popular types of radio receiver is called the superheterodyne (superhet) receiver. Here the incoming signal is mixed with a locally generated signal so that the incoming signal can enter the fixed frequency intermediate frequency stages. By changing the frequency of the local oscillator, signals on a different frequency can be received.

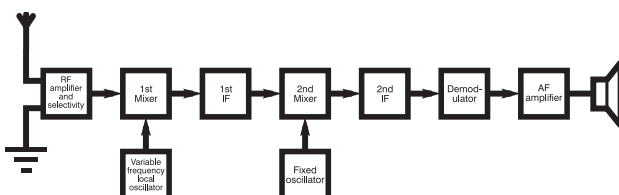
The advantage of this system is that the filter in the intermediate frequency (IF) stages is on a fixed frequency. By having a fixed frequency filter the design is made very much easier, its performance is greatly improved over a variable one, and its cost is much cheaper than a variable frequency one (if it could even be made).



**FIGURE 1: Block diagram of a single conversion superhet**

Some sets have two or more conversions as shown in Fig. 2. The additional conversions enable improved performance to be obtained chiefly in the area of image rejection. Again the main selectivity is normally contained in the last IF, which will be on the lowest frequency.

However, strong signals which are outside the bandwidth of the main filter will not affect the automatic gain control (AGC) and may

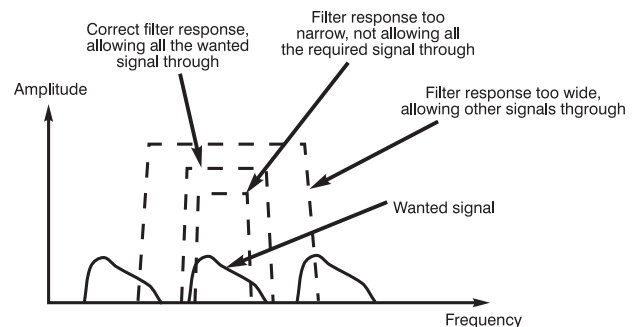


**FIGURE 2: A double conversion superhet**

overload some of the stages before the main filter. To reduce the possibility of this happening a filter known as a roofing filter is often included in the earlier stages. Although it does not have as high a specification as the main filter it will remove most of the off channel signals to a sufficiently low level to prevent overload.

Often a receiver will have a number of different filter positions. The reason for this is that different types of transmission use different bandwidths. If the filter is too wide, then it will let in unnecessary amounts of interference. However, if it is too narrow it will reject some of the wanted signal, causing distortion and giving rise to a possible loss of intelligibility.

This means that it is necessary to choose the correct filter for each receiver and possibly have a selection if the receiver needs to receive a variety of types of transmission.



**FIGURE 3: Choosing the correct filter bandwidth**

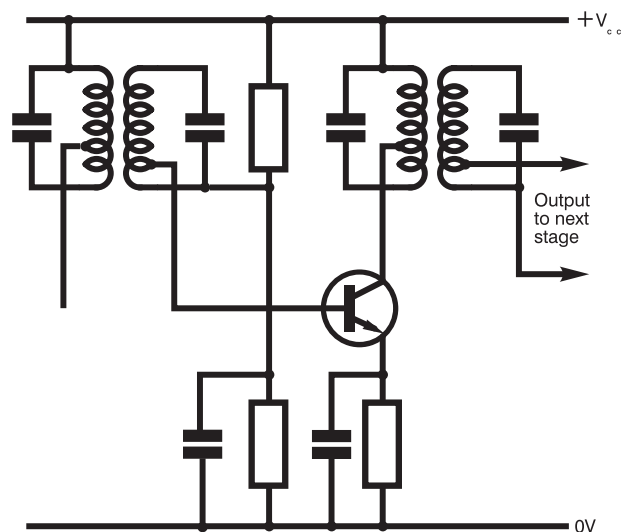
### Types of filter

There are a variety of filters that can be used in receivers. The most common types are L.C. (inductance/capacitance) filters. In early transistor radios (and valve or tube ones, too, for that matter) the filtering function was incorporated in the interstage coupling transformers. These were made resonant to give the required tuning as shown in Fig. 4.

In these circuits the transformer windings are tuned. Their resonant frequency can be trimmed by adjusting the ferrite cores that are threaded and can be screwed in and out of the former.

Normally there are two or three of these transformers in a typical set. There is one at the output of the mixer, and then further ones for each stage of amplification. These are normally adjusted to slightly different frequencies to give the required response shape. If they are all adjusted to exactly the same frequency the response may be too sharp and not wide enough.

The drawback of L.C. tuned filters like this is that their performance is normally adequate only for domestic broadcast receivers. It is not possible to obtain the levels of performance which are required for more demanding situations. Also with the widespread use of ICs (integrated circuits), circuit design methods have changed and there is



**FIGURE 4:** A circuit using an Interstage tuned transformer

generally only access on the IC package for one tuned circuit. This generally means that other forms of filter are used.

However in applications where very high levels of performance are required, crystal filters are often employed.

### Crystal filters

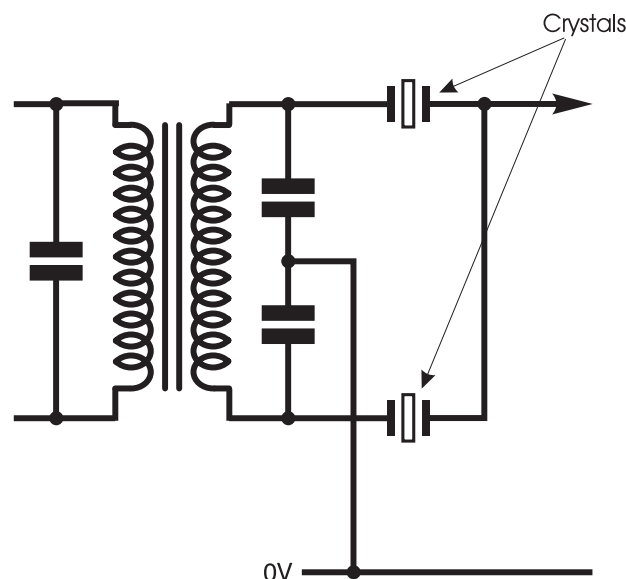
Crystal filters provide one of the most effective forms of filtering. They are based around quartz crystals that give very high degrees of selectivity.

Quartz is a naturally occurring form of silicon. However, when it is used for electronic circuits it is normally manufactured synthetically to give the required quality. The large crystals that are formed are carefully cut and lapped to the correct shape and thickness. After this, electrodes are plated onto the surface, and the whole assembly is mounted in a can which is either evacuated or filled with an inert gas.

The operation of the crystal is based around the piezo electric effect. When an electrical impulse is applied across the plates, the crystal distorts. Conversely, if the crystal is distorted slightly an electrical signal will appear across the plates.

In operation the crystal converts the signals applied to it from the intermediate frequency stage into mechanical vibrations. These vibrations are then affected by the mechanical resonances of the crystal, which are then linked back to the electrical circuit by the piezo-electric effect. The result is a very sharp filter. Its performance is far superior to that which can be achieved by an ordinary L.C. filter.

To give the performance that is required, several crystals are used in the overall filter. A typical circuit is shown in Fig. 5. It can be seen that the basic configuration is repeated. Accordingly it is very easy to vary the number of crystals which are used in accordance with the



**FIGURE 5:** A basic crystal filter circuit

cost and requirements. Often filters with six or eight crystals (often termed six or eight pole filters respectively) are used to give sufficient selectivity for use in crowded sections of the frequency spectrum.

### Monolithic filters

Like many other aspects of today's electronics it is possible to "integrate" a crystal filter onto a single quartz crystal. These monolithic filters are still more costly than their equivalent discrete quartz crystal

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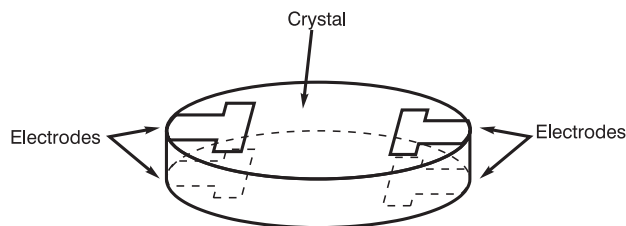
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equivalents, and comparatively few manufacturers are geared up to make them. However, they do give some performance improvements.

A basic monolithic filter is shown in Fig. 6. There are pairs of electrodes at the input and output. One pair is used as the input and the electrical signals are converted into mechanical vibrations. These track across the crystal and are altered by the mechanical resonances. These are governed by the thickness of the crystal element. At the other side of the crystal are the output electrodes that transform the vibrations back into electrical signals.



**FIGURE 6:** *Diagram of a monolithic crystal filter*

## Ceramic filters

Ceramic filters are used in a wide variety of applications. Like crystals they use the piezo-electric effect to translate electrical signals into mechanical vibrations and vice versa. However, they are very much cheaper because they are much easier to manufacture, although their performance is not nearly as good.

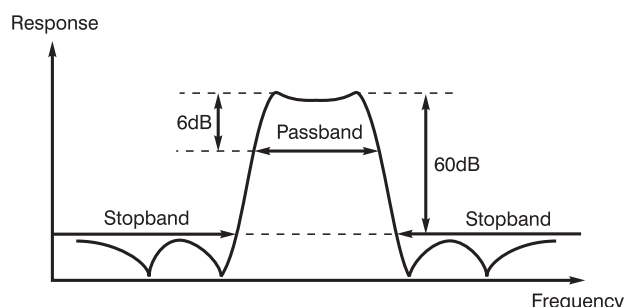
They find uses in many areas. They are used in many transistor portable radios and hi-fi tuners. These now use integrated circuits where the L.C. tuned transformers are not as suitable. One ceramic filter is often sufficient, enabling the component count to be reduced even further than if the L.C. tuned filters were used. They also do not require alignment, cutting production costs.

The filters are normally small and they are cheap to manufacture, making them ideal for many applications where the ultimate performance is not needed. In high performance sets they may often be used as roofing filters.

In view of their wide use, the technology is being developed further, and the performance of these filters is always improving. As such they are being used in far more demanding applications than was possible several years ago.

## Performance

The performance of the filtering in a receiver is crucial to its overall performance, especially in today's crowded band conditions. As a result the selectivity of a set is often quoted. The typical response of a filter will look like that shown in Fig. 7 and two main figures are



**FIGURE 7:** *Response of a typical filter*

generally quoted. From the diagram it can be seen that the filter response does not fall away infinitely fast. Instead there is a steady, if very steep, fall in the response.

The first point that is generally quoted refers to the passband, or the area where signals are accepted. This is normally taken as the frequency band to the points where the response has fallen by 6 dB, i.e., to the point where the voltage has fallen by half and the power to a quarter.

To be totally correct, the passband specification should include the amount by which the response has fallen, because in some instances a figure of 3 dB may be used instead of 6 dB. For example, the specification for the passband may be a bandwidth of 3 kHz at -6 dB. If a figure for the response is not given it is usually assumed to be -6 dB.

It is also important to know the bandwidth outside which signals are rejected. To show this, the stop-band is defined in which the response has fallen by a significant amount. Normally a figure of -60 dB is used for this. Here the power level is one millionth of the level in the passband. Sometimes other levels of rejection may be used, e.g. -50 dB, but -60 dB is the standard.

It is also useful to have a figure showing how quickly the response falls away. In an ideal world the sides of the filter would be infinitely steep so that no signals would be received outside the passband. In reality this is not possible, and a figure called the shape factor is used. This is simply the ratio of the passband and stop-band bandwidths. In this way, a filter having a response of -6 dB at 3 kHz and -60 dB at 9 kHz would have a shape factor of 3:1 at 6/60 dB.

Filters may also be quoted in terms of the number of poles they possess. Although it is not possible to show all filter theory here, in reality a crystal filter will contain a pole for each crystal. In other words a six-pole filter will contain six crystals and so forth. Also, the more poles the faster the response will fall outside the passband, reducing the levels of unwanted interference.

## Required Bandwidth

Different types of transmission require different bandwidths. Morse (CW) transmissions only require a small bandwidth, whereas amplitude modulation (AM) requires much more. For communications purposes Morse may be received using filters as narrow as 250 or 500 Hz. Single sideband is normally received with filters having passbands of around 2.7 kHz, and shortwave broadcast AM reception may be accomplished using filters of just over 6 kHz.

For narrowband frequency modulation (FM) a wider bandwidth is required, dependent upon the amount of deviation being used. Usually it is slightly less than the channel spacing – possibly around 12 to 25 kHz. For wideband broadcast, FM filters typically have a bandwidth of around 200 kHz.

## Summary

In order that the levels of interference are reduced to acceptable limits on today's crowded bands the filter performance must be as good as possible. Even with a good filter interference will be experienced, but the levels will be reduced as far as possible. This is why many people spend large amounts to ensure the filters in their receivers are as good as possible

## About the author

Ian Poole is an electronics engineer employed as a manager in a radio communications company. He is author of twelve books and many articles on several continents. More radio and electronics information can be found on Ian Poole's Radio and Electronics Web Site at: [http://website.lineone.net/~ian\\_poole](http://website.lineone.net/~ian_poole)

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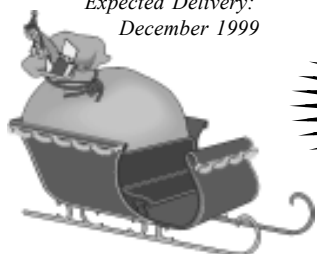
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# 20th CENTURY NOSTALGIA

## The Rise and Fall of WCC

By Timothy J. Wood

Under a late winter sky the color of a purple bruise, an excavator engine roars, a cable pulls taut, and 22 tons of red-and-white steel crash into the dormant marsh. With the demolition of the 300-foot transmitting antenna, world renowned marine radio station WCC was off the air for good.

For more than 80 years, the call letters WCC were among the most familiar and comforting to shipboard radio operators and hobbyists the world over. At one time the busiest ship-to-shore station on the globe,\* WCC broadcast and received Morse Code and Telex from a cluster of brick buildings along the shore of Chatham, Massachusetts, on the elbow of Cape Cod, an unlikely site for a communication center that played a significant role in radio history.

Along with technological firsts, WCC helped the medium mature by showing how indispensable radio could be. Arctic explorer Richard E. Byrd\*\* and aviation pioneers Charles Lindbergh and Amelia Earhart depended upon the station for invaluable weather and navigation information; both the Graf Zeppelin and the Hindenburg maintained communications with Chatham; and thousands of less high profile but just as important messages passed through the keys of the station's crack radio operators.

Sadly, technology eventually outpaced the station. The United Nations-sponsored SOLAS (Safety of Life at Sea) agreement, ending Morse Code as the official means of communications along the sea lanes, was the final spike in the grid. After being automated in 1993 by its most recent owner,



Photo courtesy Frank Hutchings

*Radiomen listen to signals at the left while behind them teletype operators wait for messages to send*

MCI Global Communications, WCC was shut down completely in 1997. Last spring, transmitting and receiving facilities were dismantled and the property sold to the town of Chatham.

### Prestigious Roots

The Chatham station was a direct descendant of the first wireless facility built in the U.S. in 1901 by Guglielmo Marconi. Located 15 miles north of Chatham in South Wellfleet, "old CC" made history with the

first two-way wireless trans-Atlantic communication between President Theodore Roosevelt and England's King Edward VII on Jan. 18, 1903.

Even then, the erosion that would eventually destroy the South Wellfleet site was evident (the original site is now about 200 feet offshore, although the Cape Cod National Seashore maintains a monument to the station at Marconi Beach). The Marconi Wireless and Telegraph Company of America set about finding a more stable

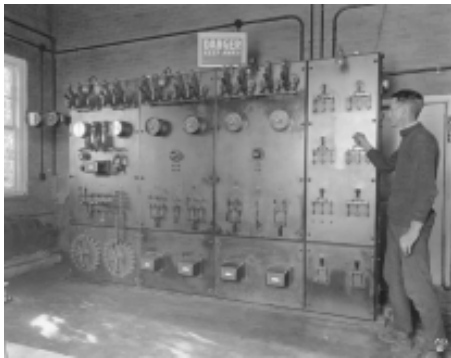


Photo courtesy Frank Hutchings

### ***Sabin Hutchings with generating equipment in the powerhouse***

location to handle increasing demand for wireless communications, then in hot competition with submerged cable.

The site chosen overlooked Ryder's Cove in Chathamport, well sheltered from the open Atlantic. Its location on Cape Cod's then-rural elbow ensured no interference with transmission signals from the growing industrial clutter on the mainland. Construction by the J.G. White Construction company began in 1914, costing a total of \$300,000.

The original station included not only the 15 buildings still standing today (all are listed on the National Register of Historic Places), but six massive, 350-foot high steel masts that stretched west for nearly six miles. Most of the masts were dismantled in late 1919 and shipped to other marine radio stations in Tuckerton and New Brunswick, N.J. The largest, located at the station compound, towered 365 feet above the ground — 447 feet above sea level — and continued to be a landmark for fishermen and boaters, its flashing beacon visible 40 miles out to sea until it was felled in 1954.

### **Changing with the Times**

During World War I, the military took over the Marconi facilities. After the war, government officials, including then secretary of the navy Franklin Roosevelt, fretted about foreign ownership of such important communications facilities and forced Marconi to sell its U.S. assets to the Radio Corporation of America, a consortium formed in 1919 by General Electric, Westinghouse Electric, American Telephone and Telegraph, and the United Fruit Companies.

The role of the Chatham station — which took the Wellfleet facilities call letters "WCC" for "Wireless Cape Cod" — changed in the early 1920s. Originally de-

signed for point-to-point communications with radio facilities in Germany, Norway and Sweden, it took on both transmitting and receiving duties for ship-to-shore communications in 1921; point-to-point activity was transferred to new RCA facilities on Long Island.

Also in 1921, RCA installed the first commercial marine vacuum tube transmitter at the Chathamport station, significantly expanding its range, which now covered the entire Atlantic Ocean, the North Sea, the Indian Ocean, Mediterranean, Caribbean and Gulf of Mexico. The Plotron Tube two kilowatt transmitter (later upgraded to five kilowatts), operating at 600 meters, was given the call letters WIM.

Increased power being pumped out by the transmitter interfered with reception, so the transmitting facilities were moved to Marion, Massachusetts, and connected to Chathamport via an overland line. Occasionally, ice forming on the wires caused problems, and personnel would be dispatched to knock caked ice off the wires or repair breaks. "The worst thing we feared was sleet on the wires," said William Ryder,

who worked at the transmitting station when it was moved from Marion to South Chatham in 1947.

In 1937, a newly-developed microwave system replaced the land lines, but ice problems continued to plague the transmitting antennae strung throughout the 68-acre South Chatham site for many years.

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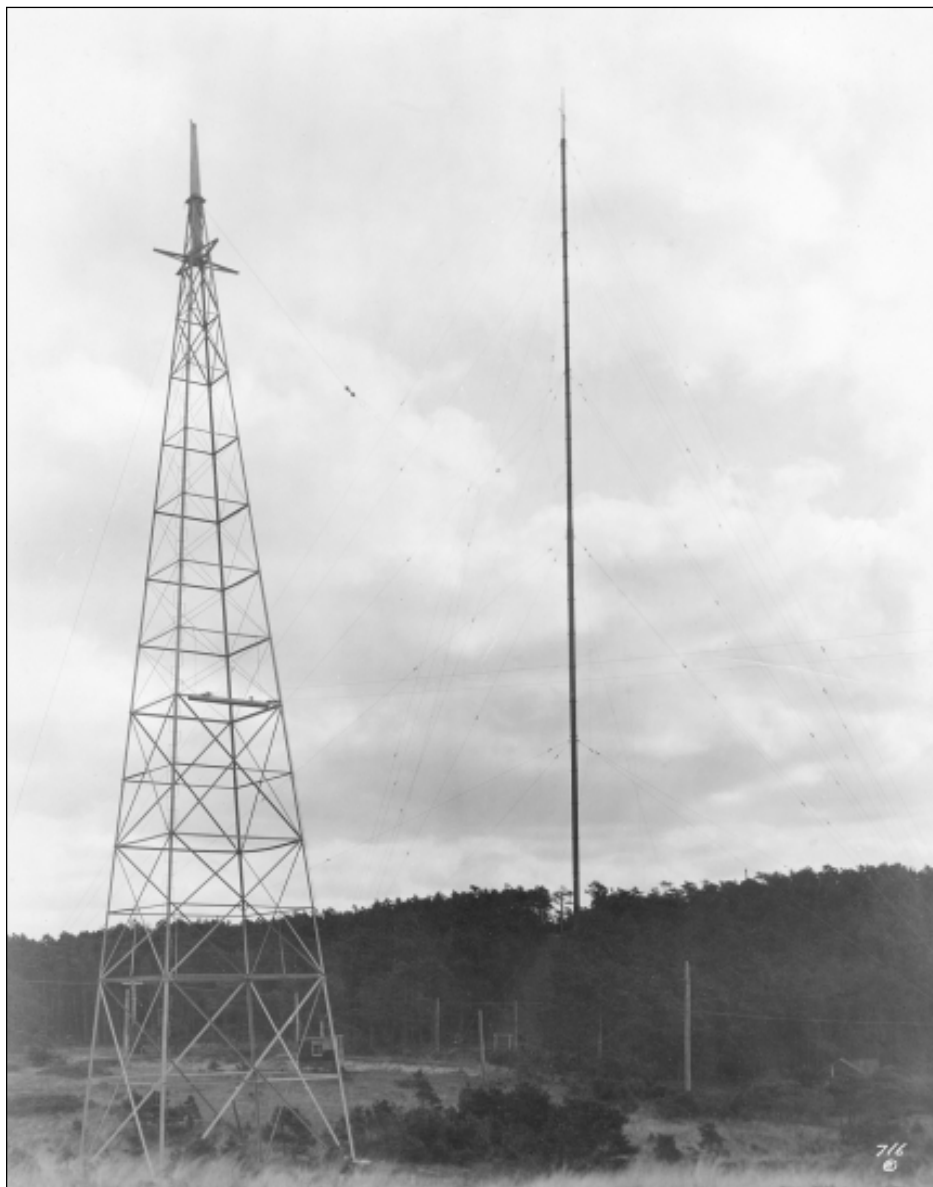
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*The 365 foot tower in the background was a landmark for fishermen and boaters, its flashing beacon visible 40 miles out to sea until it was felled in 1954*

## Operations and Operators

Between 1920 and 1930, communications traffic increased dramatically. During its heyday, WCC employed more than 30 people, most of them radio operators as well as technicians and riggers. Working around the clock, they handled as many as 1,000 messages a day; as many as 10 operators were on duty during busy periods, some capable of transcribing and sending up to 100 messages in an eight-hour shift.

All of WCC's communications were in International Morse Code, with Telex coming along after 1950. The station handled all sorts of messages, according to Lewis Masson, a former Royal Air Force radio

operator who came to WCC as a "wire man" in 1957. His job was to take messages transcribed by radio operators and transfer them onto a punch tape—later a computer terminal—for transmission to their final destination, either through Western Union or RCA. He can still recall the call letters of some ships and spoke enthusiastically about the collegial atmosphere among the workers in the operations center.

The station's ivy-covered operations center was the nerve center of WCC. With banks of radio equipment lining the open room, the atmosphere inside often grew hot and smelled of ozone given off by hundreds of vacuum tubes; it wasn't unusual to see a

haze of cigarette and pipe smoke swirling around the rotating conveyor where the operators placed messages as they came in. The click-clack of teletypes and telegraph keys filled the air.

"It was an occupation you had to like," said radio operator William Pyne. "Not many people could hack sitting there eight hours a day."

Most of the station's traffic was with ocean liners and commercial ships and consisted of radiotelegrams about arrival and departure times, cargo and other details. The station also handled personal messages and provided hotel reservation and gift services as well; you could even subscribe to magazines through WCC.

There were various classes of radiotelegrams; the most expensive, charged at a per-word rate, were those requiring rapid delivery via telegraph or telephone. When he began on the job, there were about a dozen "special handling" clients whose messages had to be delivered immediately, Masson said. Less urgent communications included night telegrams and sea letters, which were sent via land mail after being transcribed.

The station also provided news and weather updates, all by Morse Code, as well as pioneering a free medical service, known as MEDICO. If a ship at sea had a medical emergency, it could contact WCC, which would track down the nearest doctor and relay medical treatment. The service saved many lives, said Masson.

The station employed the top men in the field, most of them drawn from the military, many inveterate radio buffs and active ham operators. William Ryder built radios while growing up in Chatham and received encouragement from the men who worked at the station. He worked as a radio operator in the merchant marine before returning home to work at the South Chatham transmitting facility. Lee Baumlin, who still repairs old radios in his basement, was a radio operator at the station from 1962 until his retirement in 1992. He usually worked the "500 position," monitoring the 500 kilocycle frequency used for international distress calls.

While many of the operators could transcribe or send Morse Code at 40 or more words per minute, Baumlin said they usually had to slow down for operators at the other end.

"I figured it out once," he said. "The

Photo courtesy Frank Hutchings

number of messages we handled in a day, there weren't enough minutes in the day. I don't know how we did it. A good operator could tell a lot about a person just by the way they sent code, added retired radio operator William Pyne. "You could almost tell a person's nationality by the way they sent," he said.

The Chatham operators were the cream of the crop; even manufacturers brought equipment to WCC to be tested. Most of those who worked at the station still have their old keys. Baumlín proudly displays his "Mac" key prominently in his Cape Cod home.

During World War II, the military again assumed control of the station, bringing in their own personnel and taking over all of the facilities. Chatham Navy Radio intercepted German Navy radio traffic, pinpointing transmissions and sending the copied messages on to Washington, D.C. Dick Lumpkin, who was chief of the teletype while stationed in Chathamport for two and a half years, said when signals were intercepted, the station would inform the Navy's direction finding sites, located elsewhere, which would then plot the location of ships and U-boats.

At the height of its operation under the military, some 300 people were stationed at WCC, including more than 100 WAVES, most of them housed at local hotels. The station even had its own sick bay, with a doctor, dentist, four pharmacist mates and a Packard ambulance. Security was very tight; no one was allowed to talk about what went on there. It wasn't until a few years ago that information about the Navy's activities at the station was declassified, Lumpkin said.

## Historic Communications

Both before and after the war, the station handled communications for many historic events. The most famous include Richard E. Byrd's two expeditions to the South Pole, the first around-the-world voyage by the Graf Zeppelin in 1929, Lindbergh's 1933 flight, and Howard Hughes' 1938 trans-global flight. The station also relayed weather information to Amelia Earhart during her ill-fated attempt to fly around the world.

The station was also the last to communicate with the Hindenburg moments before it burst into flames above Lakehurst, N.J., in 1937.

In 1961, radio operator Francis Doane figured in another important event: the highjacking of the ship *Santa Maria* in the South Atlantic by Portuguese rebels. At first, the rebels maintained radio silence, ignoring the Morse Code messages directed at CSAL, the vessel's call letters. After Doane came on duty after midnight on Jan. 23, a reply finally came in from the *Santa Maria*.



*WCC staff in the early 1960s. Front row: Charles Cornwell, Francis Doane (seated), Douglas Brunnell, Lee Baumlín, William Ryder. Back row: Howard Quinn, Forest Henry, Wayne Talkington, Ed Hammons, Melvin Oliver*



*Radio operator Francis Doane*

Photo credit: Lewis Masson

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Photo credit: Lewis Masson

*The radio room in the early 1960s*

“That was a big deal,” Masson said. “They guy who held up the ship said he would communicate only with Chatham.” During the hijacking, some 8,000 words passed between the ship and WCC. It was one of the most frantic weeks ever at the station.

### Technology Marches over WCC

In South Chatham, technicians maintained the transmitters that pumped out single side band, SITOR (Simplex Telex Over Radio) and CW signals. High frequency transmissions went out over curtain dipole antennas stretched among more than 90 wooden poles, from 80 to 130 feet high.

Medium wave signals were broadcast over the 300-foot tower, the marsh and adjacent Nantucket Sound providing efficient radiation of the signal, which could be heard throughout the Atlantic, the Middle East, Indian Ocean and even in the Pacific.

As technology changed, so did WCC. In the late 1970s, SITOR and direct radio telex provided communications between a ship and its agent through the station but eliminated the need for an operator to transcribe and retransmit messages. Cubicles were installed at the operations center, giving it a modern, sterile atmosphere.

Despite a substantial investment in the facilities by MCI Global, which purchased

RCA Global Communications in 1988, business continued to decline. U.S. shipping slowed. Saying it was necessary to improve efficiency, MCI in 1993 automated the station, routing all signals to KPH, another marine radio station in Point Reyes, Calif.

“The whole maritime communications field was changing, with less emphasis placed on radio telegraphic traffic, which was really our bread and butter,” said the station’s last manager, Bill Farris, whose mother was one of the WAVES stationed at WCC during the war.

Today, the antenna poles, the 300-foot communications tower and the transmitters that broadcast WCC’s CW the world over are gone. Some equipment from the old station was saved and there is talk in the town of Chatham of transforming the former operations building into a radio museum. But the call letters WCC will live on, albeit in a very different form: the license is owned by Globe Wireless, which provides e-mail services to ships at sea. Ironically, Ferris, the last person to manager radio station WCC, now works for that company.

### About the Author

Timothy Wood is editor and reporter for the weekly *Cape Cod Chronicle*, located in Chatham.

- \* See Below 500 kHz, p. 82
- \*\* See next month’s feature on Byrd’s expedition

## TRANSMITTING/RECEIVING FACILITIES AT WCC

WCC’s first transmitter, installed in 1921, included a Pliotron Tube two kilowatt transmitter, later upgraded to five kilowatts, operating at 600 meters. The original vertical mast and multiple tuned array antennae were discarded in the early 1920s and replaced by a more effective rhombic antenna system. When first licensed for commercial traffic, the station used the 600, 2100 and 1875 meter bands.

When the transmitting facility was moved to Marion, Massachusetts, the signal was pumped out by a powerful Alexanderson 200 kilowatt long wave transmitter. In 1947, transmitting facilities were moved to a new 4,000-square-foot building overlooking Nantucket Sound in South Chatham.

A 1947 *Radio Age* article stated that the station transmitted a medium wave and 500 kilocycle distress signal at 20 kilowatts; at 10 kilowatts on low frequency; and 40 kilowatts at high frequency. High frequency signals were fed via three open wire transmission lines to curtain type dipole antennas strung on wooden poles set in a 68-acre salt marsh. A 300-foot steel antenna tower broadcast medium frequency, and a four megahertz 100-foot antenna carried low frequency signals.

The station had its own power substation with a 240 volt, 2000 amp panel and a 400 kilowatt backup generator, and at one point employed a total of 17 transmitters for single side band, SITOR and CW transmissions.

The station broadcast hourly traffic lists on the four, eight, 12, 16 and 22 megahertz marine bands.

In the mid 1980s, at its height, the station employed 34 men and women, including 21 CW operators, nine telex clerks, and four technicians.

Timothy J. Wood



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#### Bearcat®B95XLT-A1 Radio Scanner

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Frequency Coverage: 29.000-54.000 MHz., 108.000-174 MHz., 216.000-512.000 MHz., 806.000-823.995 MHz., 849.0125-868.995 MHz., 894.0125-956.000 MHz.

The Bearcat B95XLT is superb for intercepting trunked communications transmissions with features like TurboScan™ to search VHF channels at 100 steps per second. This base and mobile scanner is also ideal for intelligence professionals because it has a Signal Strength Meter, RS232C Port to allow computer-control of your scanner via optional hardware and 30 trunking channel indicator annunciators to show you real-time trunking activity for an entire trunking system. Other features include *Auto Store* - Automatically stores all active frequencies within the specified bank(s). *Auto Recording* - Lets you record channel activity from the scanner onto a tape recorder. *CTCSS Tone Board* (Continuous Tone Control Squelch System) allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: PS001 Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter \$14.95; PS002 DC power cord - enables permanent operation from your vehicle's fuse box \$14.95; MB001 Mobile mounting bracket \$14.95; EX711 External speaker with mounting bracket & 10 feet of cable with plug attached \$19.95. The B95XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, EDACS, ESAS or LTR systems.

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10 Priority Channels • Programmed Service Search

Size: 2-1/2" Wide x 1-3/4" Deep x 6" High

Frequency Coverage:

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Our new Bearcat TrunkTracker BC245XLT, is the world's first scanner designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS and EDACS analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. Our scanner offers many new benefits such as *Multi-Track* - Track more than one trunking system at a time and scan conventional and trunked systems at the same time. *300 Channels* - Program one frequency into each channel. *12 Banks, 10 Banks* - Includes 12 banks, with Aircraft and 800 MHz. 10 banks with 30 channels each are useful for storing similar frequencies to maintain faster scanning cycles or for storing all the frequencies of a trunked system. *Smart Scanner* - Automatically program your BC245XLT with all the frequencies and trunking talk groups for your local area by accessing the Bearcat national database with your PC. If you do not have a PC simply use an external modem. *Turbo Search* - Increases the search speed to 300 steps per second when monitoring frequency bands with 5 KHz. steps. *10 Priority Channels* - You can assign one priority channel in each bank. Assigning a priority channel allows you to keep track of activity on your most important channels while monitoring other channels for transmissions. *Preprogrammed Service (SVC) Search* - Allows you to toggle through preprogrammed police, fire/emergency, railroad, aircraft, marine, and weather frequencies. *Unique Data Skip* - Allows your scanner to skip unwanted data transmissions and reduces unwanted bleeps. *Memory Backup* - If the battery completely discharges or if power is disconnected, the frequencies programmed in your scanner are retained in memory. *Manual Channel Access* - Go directly to any channel. *LCD Back Light* - An LCD light remains on for 15 seconds when the back light key is pressed. *Autolight* - Automatically turns the backlight on when your scanner stops on a transmission. *Battery Save* - In manual mode, the BC245XLT automatically reduces its power requirements to extend the battery's charge. *Attenuator* - Reduces the signal strength to help prevent signal overload. The BC245XLT also works as a conventional scanner. Now it's easy to continuously monitor many radio conversations even though the message is switching frequencies. The BC245XLT comes with AC adapter, one rechargeable long life ni-cad battery pack, belt clip, flexible rubber antenna, earphone, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO, ESAS or LTR systems. Hear more action on your radio scanner today. Order on-line at <http://www.usascan.com> for quick delivery.



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Frequency step programmable in multiples of 50 Hz.

Size: 2-1/2" Wide x 1-3/8" Deep x 6-1/8" High

Frequency Coverage:

500 KHz to 823.995 MHz, 849.0125-868.995 MHz, 894.0125-2,040.000 MHz (Full coverage receivers available for export and FCC approved users.)

The AOR AR8200B is the ideal handheld radio scanner for communications professionals. It features all mode receive: WFM, NFM, SPM (Super Narrow FM), WAM, AM, NAM (wide, standard, narrow AM), USB, LSB & CW. Super narrow FM plus Wide and Narrow AM in addition to the standard modes. The AR8200 also has a versatile multi-function band scope with save trace facility, twin frequency readout with bar signal meter, battery save feature with battery low legend, separate controls for volume and squelch, arrow four way side rocker with separate main tuning dial, configurable keypad beep/illumination and LCD contrast, write protect and keypad lock, programmable scan and search including LINK, FREE, DELAY, A/D/O, LEVEL, MODE, computer socket fitted for control, clone and record, Flash-ROM no battery required memory, true carrier re-insertion in SSB modes, RF preselection of mid VHF bands, Detachable MW bar aerial. Tuning steps are programmable in multiples of 50 Hz in all modes. 8.33 KHz airband step correctly supported. Step-adjust, frequency offset, AFC, Noise limited & attenuator, Wide and Narrow AM in addition to the standard modes. For maximum scanning pleasure, you can add one of the following optional slot cards to this scanner: CT8200 CTCSS squelch & search decoder \$89.95; EM8200 External 4,000 channel backup memory, 190 search banks, \$89.95; RU8200 about 20 seconds chip based recording and playback \$89.95; TE8200 256 step tone eliminator \$59.95. In addition, two leads are available for use with the option socket. CC8200 PC control lead with CD Rom programming software \$109.95; CR8200 tape recording lead \$59.95. The AR8200B comes with 4 AA ni-cad batteries, charger, clip, lead, whip aerial, MW bar antenna, belt hook, strap and one year limited AOR warranty.

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### Uniden's SmartScanner

**T**oday we have smartcars and smartcards. We've all eaten smarties and we all know some really smart people. It was only a matter of time before we had a smart scanner.

Uniden debuted their new SmartScanner technology over the summer as a feature in the Bearcat 245XLT TrunkTracker II portable. The 245 is the first scanner to track GE/Ericsson trunked radio systems. The 245 also tracks Motorola trunking and allows you to scan and trunktrack any combination of trunked and conventional frequencies. By its very nature it is a powerful and somewhat complicated device. SmartScanner is Uniden's effort to make this and future radios easier to use.

With SmartScanner you can have your 300 channel scanner programmed for you. SmartScanner, though, will program not only frequencies, but also talkgroups and fleets maps for trunking systems. For the person who has trouble locating frequencies, understanding the manual, or comprehending trunking, SmartScanner is a lifesaver.

Here's how it works: Connect the included cable from the port on the side of the scanner to an external modem or to the serial port on your PC (to connect to an external modem you'll need a DB-9 to a DB-25 adapter). If you're connecting the cable to the serial port of your PC, you'll have to go to Uniden's web site (Uniden.com), for a free piece of software. Look under Bearcat Scanners for the BC-245, and download the modem connection software from their site (it's a tiny little program that opens up the serial port of your PC to your PC's internal modem). Run the software and follow its simple directions.

To activate SmartScanner (on the BC-245), you press and hold the E (enter) key and turn your scanner on. The radio's display will then present to you three options:

1. SCANr (SmartScanner)
2. PCCON (Direct PC Control and Programming)
3. CLONE (clone from one BC-245 to another)

If you press the E key again at option one the display will show "ZIP" and you can enter your local five digit zip code or a zip code for the area to which you're traveling. Press E again and the 900 number for the service will display (calls will average 2-3 minutes based upon modem speed at a rate of 99 cents per minute). Now press the DATA key and the scanner will command your external or internal modem to dial Uniden's server in Ft. Worth. The server will read your zip code and it will create a database specifically for your desired region.

You receive local, county, state and nationwide frequencies. The local frequencies should start with channels for your hometown and then will expand out for other local agencies within your county. County frequencies will then follow within the mix. These frequencies will include police, fire, and various local government agencies. Trunked systems will be properly programmed (one per bank) with fleet maps, talkgroups, and the correct trunk type (Motorola type 1 or 2, or EDACS).

Based on your zip code, the server will know what state you're in and will send police, fire, emergency management and forestry frequencies for your state. Finally, nationwide frequencies will be sent (as long as there is still room in the 300 channels), which include Coast

Guard, all EMS/HEAR frequencies, and a variety of other national common channels.

The Sportcat 200, which should be available by the time this issue is in your hands, also includes SmartScanner technology. This radio is not a trunktracker, however, and obviously talkgroups will not be downloaded to the radio. What's great about this receiver, though, is that it has an alpha display (unlike the BC-245). On top of everything else, SmartScanner will send alpha characters to the new Sportcat. So, after your download, and after you turn your scanner off and then on again, you'll see "NEWTON PD," for example, in the display. (Of course, if you toggle the display key on the radio you'll see the frequency for the agency as well.)

Where did all this data come from? Is it just a dump of FCC data? Not at all. A group of the nation's most knowledgeable hobbyists have created a national communications database. The database contains national, state, county and local public safety frequencies, as well as trunking fleetmaps and talkgroups (for both Motorola and Ericsson systems). The editors have used their best efforts to remove all repeater inputs, frequencies licensed as digital only, and other channels that are not generally worthwhile. No national frequency database will ever be perfect, but this enormous data set has been painstakingly cleansed and reviewed for accuracy and detail.

Over the summer there was a technical problem which prevented customers from accessing the server initially. That has been resolved. A few customers are experiencing difficulty getting their internal or external modem to synch up with the server. This can be due to a number of factors including: they have 900 number call blocking on the lines, the port settings on their PC are not correct, the type of modem they are using will not connect (although most every 9600+ baud modem should). With any new technology there will be glitches and hopefully most of these will be resolved soon.

SmartScanner isn't for everyone. If you're like many of *Monitoring Times'* experienced readers you know the exact frequencies and talkgroups you want to listen to for your area. You already know how you prefer to program your scanner – first police, then fire; or, perhaps, local agencies, then state and federal, etc. No one can program your scanner except you. Most importantly, no one can know the exact usage of every local frequency for your hometown or your local region any better than you.

If you're one of these people, then you may only wish to try SmartScanner before you travel. If you don't plan to travel, then you may never need SmartScanner. The feature does not limit the capabilities of the BC-245, SC-200 Sportcat, or any future SmartScanner-equipped unit.

SmartScanner is primarily intended for those thousands upon thousands of new and potential radio hobbyists who need some assistance programming frequencies for their local area, who do not understand how trunking works, who never heard of a fleet map and never want to, or who go to NASCAR races once per year and just want



to listen to their favorite driver.

Over the last few years in these pages we've often discussed how we can interest more people in our hobby. We recognize that factors such as the Internet and the complexities of trunking are decreasing the hobbyist rolls. With fewer hobbyists there will eventually be fewer manufacturers, book publishers, and other companies which support the industry. One of the best things we can do is to make scanning less intimidating, less complicated, and give people a running start in the hobby. SmartScanner does that.

Like many consumer electronics items, scanners are subject to return within, generally, 30 days of their purchase. Since the dawn of the scanner in the 60's, there have been millions who have purchased a scanner, brought it home, decided it was too difficult to use or understand, and returned their purchase (or they have stuck it in the basement never to see the light of day again). If SmartScanner can rescue even a fraction of these folks from what we consider to be a serious mistake, then the feature will have proven to be a success.

### ■ Trunking Report

We received the following anonymous contribution from a source within the Coast Guard which certainly patrols offshore the Florida counties included in the report. It would be interesting to know how the Coast Guard uses the TrunkTracker to monitor regional land-based communications (although it is interesting to note that the list below is not complete and data was apparently not obtained direct from the referenced agencies). As a matter of fact, if any readers have first or second-hand experience with public safety agencies utilizing a Trunktracker at either a dispatch center or in patrol vehicles, we would love to hear more about it. Here's that e-mail:

"I'd like to submit a list of VERIFIED and VALID talk(group) ID's and frequencies for Pinellas County and Pasco County in Florida.

#### Pinellas County - Motorola Type Ili

##### Frequencies (in order)

856.237 857.237 858.237 859.237 860.237  
856.462 857.462 858.462 859.462 860.462  
856.737 857.737 858.737 859.737 860.737  
856.962 857.962 858.962 859.962 860.962

##### Verified Talk(group) IDs

8192 - Tarpon Springs Police Department Channel 1  
8224 - Tarpon Springs Police Department Channel 2  
14912 - Florida Highway Patrol Pinellas Channel 1  
14944 - Florida Highway Patrol Pinellas Channel 2  
14976 - Florida Highway Patrol Pinellas Channel 3  
15008 - Florida Highway Patrol Pinellas Channel 4  
8768 - Pinellas Park Police Department Dispatch  
8800 - Pinellas Park Police Department Information  
8832 - Pinellas Park Police Department Channel 3  
8864 - Pinellas Park Police Department Channel 4  
9696 - Largo Police Department Dispatch  
9728 - Largo Police Department Information  
9824 - Largo Police Department Car-To-Car  
9760 - Largo Police Department Channel 4  
9792 - Largo Police Department Channel 5

#### Pasco County - GE/EDACS

855.812 856.837 857.837 858.837 859.837  
860.837 855.225 856.225

04-043 - Pasco County Sheriff Dispatch 1  
04-044 - Pasco County Sheriff Dispatch 2

04-045 - Pasco County Sheriff Information  
04-122 - Pasco County Sheriff (Jail?)  
05-004 - Pasco County Sheriff Talk 1  
05-044 - Pasco County Sheriff Talk (Unknown)  
05-121 - Pasco County Sheriff Talk (Unknown)  
08-042 - Dade City Police Department Information  
08-052 - Dade City Police Department Talk 1  
08-081 - Dade City Police Department Dispatch  
08-082 - Dade City Fire/EMS Channel 1  
09-001 - New Port Richey Police Department Channel 1  
09-002 - New Port Richey Police Department Channel 2  
12-041 - Pasco County Fire/EMS Dispatch 1  
12-042 - Pasco County Fire/EMS Dispatch 2  
12-043 - Pasco County Dade City Fire/EMS  
12-044 - Pasco County Fire/EMS (Unknown)  
12-045 - Pasco County Fire/EMS (Unknown)

### ■ Police Call Business License Report

Last month we highlighted California from the Volume 9 *Police Call* business section. We'll just continue that reverse order trend with some sample new and renewed license data from Volume 8.

There's nothing like trying to follow casino communications. It's fast and furious. Radio codes and casino lingo are used almost exclusively, but with a little patience you can follow the action. *Police Call 2000* is now also available on CD-ROM from Grove Enterprises. Note that the book and CD-ROM contain some selected information on trunked casino communications as well.

*Notes: The transmitter type information (base/mobile/repeater) is provided in Police Call, but not in this report.*

# TrunkTrac®

## New Version 5.2

TrunkTrac, the first, and one of the most sophisticated trunk tracking technologies available, is now even better. New pricing and additional features make TrunkTrac your best choice if you're serious about tracking Motorola Type I, II, III, and Hybrid systems. TrunkTrac now supports the BC895XLT, PCR1000, R7000, R7100, R8500, R9000, and the RS Pro 20xx series with an OS456/535 board installed.

Competing products cost more, don't decode the control channel, can't deal with Type I fleet maps, and won't properly decode many Type II talk groups. TrunkTrac's patented technology let's you do all that and much more. TrunkTrac consists of easy to use menu driven software, an FCC Class B approved signal processing board you plug into an ISA slot in your PC, a serial interface, and a discriminator buffer for your scanner. Everything you need, including cables, is supplied. With TrunkTrac you'll have access to Private Call and Interconnect activity and can follow up to four systems at once. Any combination of VHF/UHF/800/900 MHz systems, including FED-SMR trunking, is supported. TrunkTrac lets you assign a 35 character alpha tag (up to 1000/system) to all IDs. You can set Lockouts, Personality Files, Scan Lists, and much more. TrunkTrac lets you log system activity to an ASCII file for database import and traffic analysis. We think you'll like TrunkTrac so much it comes with a 30 day money back guarantee. And For a limited time, when you purchase TrunkTrac, we will install the discriminator mod in your scanner for free.

**TrunkTrac ver 5.2.....\$297.95**

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# **SCANNING REPORT** (continued)

<u>Licensee Name</u>	<u>Licensee City</u>	<u>Frequency</u>	<u>Licensee Name</u>	<u>Licensee City</u>	<u>Frequency</u>
<b>Sample Transit</b>					
Ceasars Tahoe Shuttle Service	Lake Tahoe	464.2750	Excalibur Hotel Casino	Las Vegas	462.8500
Ceasars Tahoe Shuttle Service	Stateline	462.0000	Excalibur Hotel Casino	Las Vegas	855.2875
Gray Line Las Vegas	North Las Vegas	452.8250	Excalibur Hotel Casino	Las Vegas	857.9125
Las Vegas Transit System	Las Vegas	452.0500	Excalibur Hotel Casino	Las Vegas	858.2875
Las Vegas Transit System	Las Vegas	452.8000	Excalibur Hotel Casino	Las Vegas	859.8375
Las Vegas Transit System	Las Vegas	452.8250	Excalibur Hotel Casino	Las Vegas	860.8375
<b>Sample Cabs</b>			Mirage Hotel and Casino	Las Vegas	852.6375
Bell Luxury Limousine	Reno	452.3500	Mirage Resorts/Treasure Island	Las Vegas	852.6375
Reno Cab Company	Reno	152.3000	Mirage Resorts/Treasure Island	Las Vegas	853.4875
Reno Cab Company	Reno	157.5600	Mirage Resorts/Treasure Island	Las Vegas	851.6875
Reno Sparks Cab Company	Reno	157.5600	Mirage Resorts/Treasure Island	Las Vegas	852.6875
Reno Sparks Cab Company	Reno	152.3000	Mirage Resorts/Treasure Island	Las Vegas	852.9875
Reno Sparks Cab Company	Reno	152.3900	Mirage Resorts/Treasure Island	Las Vegas	853.0875
Reno Sparks Cab Company	Reno	157.6500	Mirage Resorts/Treasure Island	Las Vegas	853.4125
Union Cab Company Inc	Las Vegas	157.5600	Mirage Resorts/Treasure Island	Las Vegas	853.6375
Union Cab Company Inc	Las Vegas	152.3000	Mirage Resorts/Treasure Island	Las Vegas	854.6375
Vegas Western Cab Company	Las Vegas	854.9125	Mirage Resorts/Treasure Island	Las Vegas	856.9125
Whittlesea Blue Cab Company	Las Vegas	452.4500	Mirage Resorts/Treasure Island	Las Vegas	858.9125
Whittlesea Checker Taxi Inc	Reno	152.4500	Mirage Resorts/Treasure Island	Las Vegas	859.8125
Whittlesea Checker Taxi Inc	Reno	157.6650	Mirage Resorts/Treasure Island	Las Vegas	859.9125
Whittlesea Checker Taxi Inc	Reno	157.7100	Mirage Resorts/Treasure Island	Las Vegas	860.9125
Yellow Cab	Las Vegas	152.2700	Mirage Resorts/Treasure Island	Las Vegas	935.9125
Yellow Cab	Las Vegas	152.3300	Mirage Resorts/Treasure Island	Las Vegas	936.4125
Yellow Cab	Las Vegas	152.4500	Mirage Resorts/Treasure Island	Las Vegas	936.5000
Yellow Cab	Las Vegas	157.5300	Mirage Resorts/Treasure Island	Las Vegas	936.9000
Yellow Cab	Las Vegas	157.5900	Mirage Resorts/Treasure Island	Las Vegas	936.9750
Yellow Cab	Las Vegas	157.7100	Mirage Resorts/Treasure Island	Las Vegas	937.4125
<b>Sample Miscellaneous Organizations</b>			Mirage Resorts/Treasure Island	Las Vegas	937.4750
Adelaide Crown Project	Winnemucca	461.1750	Mirage Resorts/Treasure Island	Las Vegas	937.9250
Adelaide Crown Project	Winnemucca	463.2750	Mirage Resorts/Treasure Island	Las Vegas	938.4375
Alpine Wildfire Service	Gardnerville	154.5400	Mirage Resorts/Treasure Island	Las Vegas	939.9625
Amateur Radio Emergency Services	Fremont	462.0625	Palace Station Hotel & Casino	Las Vegas	154.6000
Amateur Radio Emergency Services	Fremont	463.2375	Palace Station Hotel & Casino	Las Vegas	463.3000
Amateur Radio Emergency Services	Fremont	463.8875	Palace Station Hotel & Casino	Las Vegas	463.2875
Amateur Radio Emergency Services	Fremont	463.9375	Palace Station Hotel & Casino	Las Vegas	463.3125
Amateur Radio Emergency Services	Fremont	464.4625	Palace Station Hotel & Casino	Las Vegas	464.2750
American Peace Test	Salem	464.0000	Palace Station Hotel & Casino	Las Vegas	467.7750
Carpenters Local 971	Reno	464.3500	Palace Station Hotel & Casino	Las Vegas	467.8000
Center For Employment Training	Las Vegas	151.8050	Palace Station Hotel & Casino	Las Vegas	467.8250
Corrections Corp of America	Nashville	463.2375	Palace Station Hotel & Casino	Las Vegas	853.9125
Corrections Corp of America	Nashville	463.8625	Palace Station Hotel & Casino	Las Vegas	854.3875
Corrections Corp of America	Nashville	463.9125	Palace Station Hotel & Casino	Las Vegas	936.1500
Corrections Corp of America	Nashville	463.6500	Palace Station Hotel & Casino	Las Vegas	936.6875
Corrections Corp of America	Nashville	463.9750	Palace Station Hotel & Casino	Las Vegas	938.1375
Culinary Workers Union Local 226	Las Vegas	464.3500	Palace Station Hotel & Casino	Las Vegas	938.6750
Elko Band Council	Elko	157.6050	Sands Expo & Convention Center	Las Vegas	461.3125
Teamsters Local 631	Las Vegas	463.5500	Sands Expo & Convention Center	Las Vegas	464.6375
Teamsters Local 631	Las Vegas	464.1000	Sands Expo & Convention Center	Las Vegas	469.5875
<b>Sample Hotel &amp; Casinos</b>			Sands Expo & Convention Center	Las Vegas	469.6125
Cactus Petes	Jackpot	151.9550	Sands Expo & Convention Center	Las Vegas	469.8875
Cactus Petes	Jackpot	151.6550	Sands Expo & Convention Center	Las Vegas	469.9125
Cactus Petes	Jackpot	151.6850	Sands Hotel and Casino	Las Vegas	461.9000
Cactus Petes	Jackpot	151.7150	Sands Hotel and Casino	Las Vegas	460.9125
Cactus Petes	Jackpot	151.8050	Sands Hotel and Casino	Las Vegas	460.9375
Cactus Petes	Jackpot	151.9250	Sands Hotel and Casino	Las Vegas	462.0500
Cactus Petes	Jackpot	151.9550	Sands Hotel and Casino	Las Vegas	462.9000
Cactus Petes	Jackpot	152.4800	Sands Hotel and Casino	Las Vegas	464.7000
Cactus Petes	Jackpot	464.3250	Sands Hotel and Casino	Las Vegas	859.7875
Cactus Petes	Jackpot	464.4250	<b>Sample Sports</b>		
Desert Inn	Las Vegas	463.5750	Las Vegas Mini Gran Prix Inc	Las Vegas	154.6000
Desert Inn	Las Vegas	464.4250	Las Vegas Motor Speedway Inc	Las Vegas	461.5625
Desert Inn	Las Vegas	464.6750	Las Vegas Motor Speedway Inc	Las Vegas	462.7500
Desert Inn	Las Vegas	464.9250	Las Vegas Motor Speedway Inc	Las Vegas	463.2125
Desert Inn	Las Vegas	857.7875	Las Vegas Motor Speedway Inc	Las Vegas	464.4750
Desert Inn	Las Vegas	858.7875	Las Vegas Motor Speedway Inc	Las Vegas	464.9750
Excalibur Hotel Casino	Las Vegas	468.4875	Reno Air Racing Association Inc	Reno	151.6850
Excalibur Hotel Casino	Las Vegas	853.4875	Reno Air Racing Association Inc	Reno	151.8050
			Reno Air Racing Association Inc	Reno	151.9250
			Reno Air Racing Association Inc	Reno	151.7150
			Reno Air Racing Association Inc	Reno	152.3600

# New Fire Frequency Allocations

This month's *Service Search* column will be taking an in-depth look at the new fire frequency allocations currently being licensed by the Federal Communications Commission. Scanner listeners should be listening for newly allocated splinter channels (VHF 7.5 kHz/ UHF 6.25 kHz) to become active in their areas.

Kilohertz			
1630	Base or mobile		
Megahertz			
33.42	Mobile or fixed	10 watts or less	
33.44	Base or mobile		
33.46	Mobile		
33.48	Base or mobile		
33.50	Mobile		
33.52	Base or mobile		
33.54	Mobile		
33.56	Base or mobile		
33.58	Mobile		
33.60	Base or mobile		
33.62	Mobile		
33.64	Base or mobile		
33.66	Mobile		
33.68	Base or mobile		
33.70	Base or mobile		
33.72	Base or mobile		
33.74	Base or mobile		
33.76	Base or mobile		
33.78	Base or mobile		
33.80	Base or mobile		
33.82	Base or mobile		
33.84	Base or mobile		
33.86	Base or mobile		
33.88	Base or mobile		
33.90	Base or mobile		
33.92	Base or mobile		
33.94	Base or mobile		
33.96	Base or mobile		
33.98	Base or mobile		
45.88	Base or mobile	Intersystem	
46.06	Base or mobile		
46.08	Base or mobile		
46.10	Base or mobile		
46.12	Base or mobile		
46.14	Base or mobile		
46.16	Base or mobile		
46.18	Base or mobile		
46.20	Base or mobile		
46.22	Mobile		
46.24	Mobile		
46.26	Mobile		
46.28	Mobile		
46.30	Mobile or fixed	Maximum power 10 watts	
46.32	Mobile		
46.34	Mobile		
46.36	Base or mobile		
46.38	Base or mobile		
46.40	Base or mobile		
46.42	Base or mobile		
46.44	Base or mobile		
46.46	Base or mobile		
46.48	Base or mobile		
46.50	Base or mobile		
72.44	Mobile	Fire Call Box Operation	
72.48	Mobile	Fire Call Box Operation	
72.52	Mobile	Fire Call Box Operation	
72.56	Mobile	Fire Call Box Operation	
72.60	Mobile	Fire Call Box Operation	
75.44	Mobile	Fire Call Box Operation	
75.48	Mobile	Fire Call Box Operation	
75.52	Mobile	Fire Call Box Operation	
75.56	Mobile	Fire Call Box Operation	
75.60	Mobile	Fire Call Box Operation	
153.770	Mobile		
153.7775	Mobile	Bandwidth not to exceed 11.25 kHz	
153.830	Mobile	Maximum power of 100 watts	
153.8375	Mobile	Maximum power of 100 watts/Bandwidth not to exceed 11.25 kHz	
153.890	Mobile		
153.8975	Mobile	Bandwidth not to exceed 11.25 kHz	
153.950	Mobile		
153.9575	Mobile	Bandwidth not to exceed 11.25 kHz	
154.010	Mobile		
154.0175	Mobile	Bandwidth not to exceed 11.25 kHz	
154.070	Mobile		
154.0775	Mobile	Bandwidth not to exceed 11.25 kHz	
154.130	Base or mobile		
154.1375	Base or mobile	Bandwidth not to exceed 11.25 kHz	
154.145	Base or mobile		
154.1525	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.160	Base or mobile		
154.1675	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.175	Base or mobile		
154.1825	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.190	Base or mobile		
154.1975	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.205	Base or mobile		
154.2125	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.220	Base or mobile		
154.2275	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.235	Base or mobile		
154.2425	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.250	Base or mobile		
154.2575	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.265	Base or mobile		Intersystem
154.2725	Base or mobile		Intersystem/Bandwidth not to exceed 11.25 kHz
154.280	Base or mobile		Intersystem
154.2875	Base or mobile		Intersystem/Bandwidth not to exceed 11.25 kHz
154.295	Base or mobile		Intersystem
154.3025	Base or mobile		Intersystem/Bandwidth not to exceed 11.25 kHz
154.310	Base or mobile		
154.3175	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.325	Base or mobile		
154.3325	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.340	Base or mobile		
154.3475	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.355	Base or mobile		
154.3625	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.370	Base or mobile		
154.3775	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.385	Base or mobile		
154.3925	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.400	Base or mobile		
154.4075	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.415	Base or mobile		
154.4225	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.430	Base or mobile		
154.4375	Base or mobile		Bandwidth not to exceed 11.25 kHz
154.445	Base or mobile		
154.4525	Base or mobile		Bandwidth not to exceed 11.25 kHz
166.250	Base or mobile		Only within 150 miles of NYC
170.150	Base or mobile		Only within 150 miles of NYC
460.525	Base or mobile		
460.53125	Base or mobile		Bandwidth not to exceed 6 kHz
460.5375	Base or mobile		Bandwidth not to exceed 11.25 kHz
460.54375	Base or mobile		Bandwidth not to exceed 6 kHz
460.550	Base or mobile		
460.55625	Base or mobile		Bandwidth not to exceed 6 kHz
460.5625	Base or mobile		Bandwidth not to exceed 11.25 kHz
460.56875	Base or mobile		Bandwidth not to exceed 6 kHz
460.575	Base or mobile		
460.58125	Base or mobile		Bandwidth not to exceed 6 kHz
460.5875	Base or mobile		Bandwidth not to exceed 11.25 kHz
460.59375	Base or mobile		Bandwidth not to exceed 6 kHz
460.600	Base or mobile		
460.60625	Base or mobile		Bandwidth not to exceed 6 kHz
460.6125	Base or mobile		Bandwidth not to exceed 11.25 kHz
460.61875	Base or mobile		Bandwidth not to exceed 6 kHz
460.625	Base or mobile		
460.63125	Base or mobile		Bandwidth not to exceed 6 kHz
460.6375	Base or mobile		Bandwidth not to exceed 11.25 kHz
460.64375	Base or mobile		Bandwidth not to exceed 6 kHz
465.525	Mobile		
465.53125	Mobile		Bandwidth not to exceed 6 kHz
465.5375	Mobile		Bandwidth not to exceed 11.25 kHz
465.54375	Mobile		Bandwidth not to exceed 6 kHz
465.550	Base or mobile		
465.55625	Base or mobile		Bandwidth not to exceed 6 kHz
465.5625	Base or mobile		Bandwidth not to exceed 11.25 kHz
465.56875	Base or mobile		Bandwidth not to exceed 6 kHz
465.575	Mobile		
465.58125	Mobile		Bandwidth not to exceed 6 kHz
465.5875	Mobile		Bandwidth not to exceed 11.25 kHz
465.59375	Mobile		Bandwidth not to exceed 6 kHz
465.600	Mobile		
465.60625	Mobile		Bandwidth not to exceed 6 kHz
465.6125	Mobile		Bandwidth not to exceed 11.25 kHz
465.61875	Mobile		Bandwidth not to exceed 6 kHz
465.625	Mobile		
465.63125	Mobile		Bandwidth not to exceed 6 kHz
465.6375	Mobile		Bandwidth not to exceed 11.25 kHz
465.64375	Mobile		Bandwidth not to exceed 6 kHz

# Y2k: The Witching Hour Approaches

**T**his month, I must remember to renew my lifetime library card at UCLA. No, I haven't been reincarnated. It's better than that. When UCLA issued my card, their system could not process years beyond 1999, and so now I must be born again. Wonderful things, these computers.

Such little nuisances are likely to be the most common problems from "Y2k," the overhyped "year 2000 computer bug." Oh, there will be some error propagation through our over-automated society, when a few machines get confused and confuse other machines around them. Such cumulative errors are unpredictable, though hardly world-threatening, and it may take months to work through all of them. There may be some brief hassles, some year-end panic, and perhaps even a run on emergency supplies. No problem. After all, emergency supplies are good to have. You never know when there'll be a storm, flood, or earthquake.

Back in the real world, though, there are still plenty of scary scenarios flying around, since good emergency planners must assume the worst. As the midnight hour approaches, many people will be busy this New Year's Eve. No one knows yet what they'll be doing, but it will certainly involve HF (short-wave) radio. That is for sure.

## ■ Good Old HF

HF, our tried and true frequency band between 3 and 30 megahertz (MHz), hasn't gotten much respect of late. It's a casualty of the over-automation we mentioned above. Why pay skilled operators to sit at radios when computers can buzz away over satellite links all by themselves?

This has changed, at least for a year. All this fancy hardware is considered a high Y2k risk. Guess what the primary fallback mode is. That's right; good old HF.

The US is somewhat fortunate in seeing The Hour Of Doom later than most of the planet. For most of our December 31st, it will be midnight somewhere else. The century rollover will start at 1200 (or even 1100) Coordinated Universal Time, in mid-Pacific, on the International Date Line. From New Zealand, it'll roll westward across our spinning globe, through Asia, past the Middle East and Africa, to Europe, the Americas, the East Pacific, and finally ending in Western Samoa.

As this global sweep occurs, several worldwide HF nets will monitor the situation. Hams, for example, plan to set up contact with New Zealand and other countries in the Pacific region from 1200 UTC on. This should be a pretty good listen, especially if unforeseen problems come up somewhere, requiring proactive action before The Witching Hour arrives here.

## ■ No Party for You!

While the world watches "The Millennium" on TV, trying to convince itself it's having a good time, an amazing number of people will have to baby-sit computers, check building safety, reset devices, or staff emergency centers. It's hard to find an agency, or even a large company, which doesn't plan at least a slightly heightened operation on New Year's Eve.

One good idea is to immediately start monitoring all those little nets that US Federal agencies hold, usually early on Wednesday mornings.

I've found these to be gold mines for upcoming schedules and Y2k information, as control stations read bulletins to the net. Most are upper sideband (USB) voice, though lately I notice alternate control stations occasionally using the lower sideband (LSB) with a beam in the opposite direction. The 3-kilohertz (kHz) spacing eliminates most of the interference.

Since 1300 UTC is a little too early on the West Coast, some of the best stuff comes when I'm sound asleep. Fortunately, Jack Metcalfe listens to these from Kentucky, and he has sent this column some very nice listings. Many of the following frequencies are from his contributions, which are very much appreciated.

As New Year's comes, another good bet is probably NCS, the National Communications System. It's a huge, convoluted network created by the US government, the military, and (speculatively) the intelligence community to maintain civil order in emergencies. Since NCS operates the National Telecommunications Coordination Network (NCTN), and this is tasked with maintaining crucial telecoms, Y2k is right up their alley. We've been hearing quite a few stations with callsigns of "NC" plus a number on NCS frequencies, of which there are hundreds.

NCS also supervises an even more amorphous frequency pool/traffic system called SHARES (Shared Resources). SHARES is heavily supported by MARS, the amateur Military Affiliate Radio Service. Other players include the Federal Emergency Management Agency (FEMA), the Federal Aviation Agency (FAA), the Federal Communications Commission (FCC), large power grid operators, the "phone com-

pany," many state emergency centers, and just about every other big agency out there.

This column also lists most of the key MARS nets, but there are many others meeting daily or weekly. Tuning the 400 or so kHz above and below the 80, 40, and 20 meter ham bands will turn most of them up.

## ■ What about the Guard?

Internet, the greatest rumor factory ever fashioned by the ingenious human mind, is abuzz with stories of a huge National Guard mobilization for Y2k. Oh, if this were only so. It would make some great radio traffic.

In truth, many states are putting certain limited elements of the Guard on a low state of alert. If the Guard's national communication exercises of May and September are any indication, HF figures heavily in all contingencies here. "Higher Focus," as the May exercise was called, demonstrated that the Pentagon and several control stations could make HF contact with 52 of the 54 regional stations, in all states plus DC and the territories.

Even more impressively, 22 maintained quality voice contact for the entire period, and 23 kept up continuous Automatic Link Establishment capability (ALE). ALE data bursts and USB voice communications were heard as far away as New Zealand. Callsigns were "NGB" (National Guard Bureau), plus a number. These callsigns may be used again.

In this column, all frequencies shown are the "Dial/Window," or in other words what your radio reads to tune them in. All modes are USB unless noted. All times are UTC.

Happy New Year!





## ■ Y2k Danger Dates

Dec. 1, 1999 .....	Monthly program cycles pass into Y2k.
Dec. 25, 1999 .....	Weekly cycles pass into Y2k.
Dec. 31, 1999 .....	Rollover starts, 1200 UTC.
Jan. 1, 2000 .....	Rollover ends, 1200 UTC.
Jan. 2, 2000 .....	High potential for error propagation.
Jan. 3, 2000 .....	First business day of 2000.
Feb. 29, 2000 .....	Leap Year Day, might appear as March 1.
Mar. 1, 2000 .....	Might appear as February 30.
Apr. 1, 2000 .....	(US) Possibility of premature daylight time.
Apr. 15, 2000 .....	US tax deadline – don't get this one wrong!
Oct. 10, 2000 .....	First Y2k ten-figure date (10-10-2000)
Oct. 28, 2000 .....	(US) Possibility of erroneous standard time.
Dec. 31, 2000 .....	Actual last day of 20th century & 2nd Millennium.
Dec. 31, 2019 .....	Last future date accepted by unmodified Excel 95.

Leap year bug: even centuries are not leap years, but 2000 is an exception not always remembered by software writers.

## ■ Weekly Federal Nets

<b>kHz</b>	<b>Agency</b>	<b>Weekly Net</b>	<b>Heard by</b>
4585.0	Civil Air Patrol	Daily 0100	Ed.
4821.0	Federal Agencies Net	Wed 1430	JM, PB
5015.0	USACE Southern Region	Mon 1500	Ed.
5140.0	MO SECURE	Wed 1430	JM
5140.0	OK SECURE	Wed 1500	JM
5203.5	NC National Guard	Wed 1300, 1400	JM
5211.0	NECN/FEMA	Varies	JM, Ed.
5236.0	SHARES	Wed 1600	Ed.
5383.0	New Zealand Civil Defence	Wed 2100	??
5755.0	Region 7 Fed. Agencies Net	Wed 1430	JM
5848.0	USACE	Wed 1330	Ed.
6870.0	FAA Southern Region (LSB)	Wed 1400	JM
7302.0	Air Force MARS Southern Region	Daily? 1500	Ed.
7477.0	OK SECURE	Wed 1600	JM
7635.0	Civil Air Patrol	Daily 0000	Ed.
7743.0	Region 7 Fed. Agcys. Net	Wed 1430	JM
8093.0	National Guard	Wed 1430	JM
8125.0	NARACS (FAA)	Wed 1130	JM
8125.0	FAA Eastern Region	Wed 1545	JM
9122.0	USACE Southern Region	Mon 1600	Ed.
9185.0	Region 7 FAN	Wed 1430	JM
10493.0	NECN/FEMA	Varies	JM, Ed.
11045.0	Federal Agencies Net	Wed 1400	PB
12178.7	Region 7 FAN (old freq)	Wed 1415	JM, PB
13434.0	Region 7 FAN (new freq)	Wed 1400	JM, PB
13457.0	FAA Western Region	Wed 1730	JM, Ed.
14396.5	SHARES	Wed 1600	Ed.

- If nothing is heard, try an hour later, as a few times are for DST.
- NARACS is the FAA's National Radio Communication System.
- NECN is the National Emergency Coordination Net, run by FEMA WGY 912.
- Federal Agencies Net is the former Federal Highway Administration net, still on FHWA frequencies.
- USACE is the US Army Corps Of Engineers.
- JM = Jack Metcalfe, PB = Paul Bunyan

## ■ US Army National Guard

The following frequencies were active in the May communication exercise. Most were heard by Jack Metcalfe. 6766 and 12168.5 are also used by the US Army Training and Doctrine Command (TRADOC). All are USB unless noted.

3032 (night primary)	4442	4445	4520	5202
5203.5	5217	6766 (evening primary)		6910
7648.5	8047	8061.5 (LSB)	8093 (day primary)	
9121	10796	12168.5.		

## ■ SHARES Coordination Net (SCN)

USB voice channels 1 and 2 allow member stations to check in and out of SHARES, or to update their status with their regional SCS, Shares Coordination Station. ALE-capable stations can exchange data bursts on three or more frequencies. The BBS is a computer "bulletin

board system," or message center accessed by several Internet-like "packet radio" modes.

SCN normally operates at "level 3" (routine). A likelihood of emergency conditions raises this to level 2, with hourly or half-hourly checkins and bulletins. Level 1, under current policy, is reserved for extreme emergencies, and has not been used outside quarterly drills since hurricane Bonnie in 1998.

<b>Channel #</b>	<b>kHz</b>	<b>Use</b>
1	5236.0	Voice Primary 1 (night)
2	14396.5	Voice Primary 2 (day)
3	4490.0	Auto Link Establishment (ALE)
4	5711.0	ALE
5	9106.0	ALE
6	11217.0	ALE
7	15094.0	ALE
8	17486.0	ALE
9	6800.0	BBS 1
10	13242.0	BBS 2

## ■ Some Key Callsigns

Many agencies use calls from sequential blocks. The dash (–) corresponds to a letter that changes in calls of different stations. A number sign (#) is a changing number. Often the numbers are a clue to geographic regions.

<b>Call</b>	<b>Agency</b>	<b>Location</b>
AAB1DC	US Army MARS	Washington, DC
AAB1NGB	National Guard	Arlington, VA
AAR#USA	US Army MARS	Number is region
AAR1DD	US Army MARS	SCS Northeast (W Hartland, CT)
AAA0USA	US Army MARS	SCS Northwest (Tacoma, WA)
AFA3HY	US Air Force MARS	SCS Central (Shawnee, KS)
KBW 49	Dept. Of Energy	Las Vegas, NV
KCP63	FAA	SCS Mountain (Longmont, CO)
KEM 80	FAA	Washington, DC
KGA 93	FCC	Washington, DC
KGD 34	NCC	Arlington, VA
KGE 66	Dept. Of Justice	Washington, DC
KGG 85	FBI	Washington, DC
KHA 908	NASA	SCS West (Mt View, CA)
KNY, Z ##	NCS	Nationwide
NATIONAL CAP 4	Civil Air Patrol	Washington, DC
NAV	USN-MC MARS	Washington, DC
NMC	US Coast Guard	Pt. Reyes, CA
NMN	US Coast Guard	Chesapeake, VA
NNN0VUV	US Navy-Marine MARS	SCS South (Costa Mesa, CA)
WGY 9##	FEMA/EOC	Last number indicates region
WGY 912	FEMA	Berryville, VA
WGY 918	FEMA	Denver, CO
WNFT 417	NTA	SCS East (Washington, DC)
WNIM867	NTA	SCS Midwest (Ballwin, MO)
WPIH728	AT&T	SCS Southeast (Conyers, GA)
WUO	USACE	Washington, DC
WUG3	USACE	SCS South
WWJ + ##	FHWA	Nationwide

EOC	Emergency Operations Center(s)
FBI	Federal Bureau of Investigation (Many ALE freqs in use)
NASA	National Aeronautics and Space Administration
NTA	National Telecommunications Alliance, replaces Bellcore

## ■ MARS Emergency Net Frequencies

<b>kHz</b>	<b>Use</b>
3311.0	Air Force Calling
4041.0	Navy-Marine Common Emerg.
4590.0	Air Force Calling
6826.0	Army MARS
6999.0	Army Emerg. Guard
7317.0	Army Inter-Regional (LSB)
7372.5	Navy Southern Region
7381.0	Navy-Marine common
7498.5	Navy-Marine Corps
7540.0	Air Force MARS
13506.5	Army Inter-Regional
13910.5	Army Emergency
13993.0	Air Force Calling
13996.0	Army & Joint Guard
14383.5	Navy-Marine Calling/Emerg
14389.0	Air Force MARS
14390.5	Army MARS

## Abbreviations used in this column

AFB	Air Force Base	MARS	Military Affiliate Radio System
AFS	Air Force Station	MFA	Ministry of Foreign Affairs
ALE	Automated Link Establishment	NASA	National Aeronautics and Space Administration
AM	Amplitude Modulation	Ops	Operations
ANDVT	Advanced Narrowband Digital Voice Terminal	RSA	Republic of South Africa
ARQ	Automatic Repeat Request teleprinting scheme	RS-ARQ	Simplex ARQ teleprinting scheme
AWACS	Airborne Warning And Control System	RTTY	Radio Teletype
CAMSLANT	Communication Area Master Station, Atlantic	SAM	Special Air Mission
CAMSPAC	Communication Area Master Station, Pacific	STS	Space Transportation System ("space shuttle")
CIA	Central Intelligence Agency	UK	United Kingdom
COMSUBLANT	Commander, Submarine Atlantic	UKSUBCAMS	United Kingdom Submarine Communications Area Master Station
CP	Command post	Unid	Unidentified
CW	Morse code telegraphy ("Continuous Wave")	US	United States
DEA	Drug Enforcement Agency	USCG	US Coast Guard
FEC	Forward Error Correction teleprinting scheme	USCGC	US Coast Guard Cutter
FHWA	Federal Highway Administration	USS	United States Ship
GANTSEC	Greater Antilles Section	VIP	Very Important Person
JSTARS	Joint Surveillance Target Attack Radar System		
LDOC	Long Distance Operational Control		

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time).

- 4441.0 SAM 50050-US Air Force VIP C-20C, working SAM 60204 at 0536. Air Force One (presidential aircraft) working SAM 60204 at 0610. (Paul Bunyan-MO)
- 4487.0 COMSUBLANT-US Navy Commander of Submarine Forces, Atlantic, with RTTY news and sports reports, at 0315. (Bunyan-MO) COMSUBLANT, with RTTY for Brazilian submarine SS *Tamoio*, also using 4325, at 0552 (Tom Severt-USA) *All this is for foreign submarines in joint exercises.* -Hugh
- 4521.5 NASA Booster Recovery Vessels *Freedom Star* and *Liberty Star*, working Cape Radio, Cape Canaveral, FL, recovering STS-93 rockets at 0145. (Bunyan-MO)
- 5320.0 US Coast Guard Cutter *Legere* (WMEC 912) discussing distressed vessels with USCGC *Pt. Bonita*, clear and secure, at 2350. (Ron Perron-MD)
- 5717.0 Canadian Rescue 462-Canadian Forces CC-115, with patch to Rescue Coordination Center via Trenton, at 0906. (Perron-MD)
- 5841.0 Coast Guard 63A-USCG aircraft with departure report for Panther (DEA ops, Bahamas), at 0015. (Perron-MD)
- 6378.0 4XZ-Israeli intelligence, Tel Aviv, with CW markers at 0213. (Camilo Castillo-Panama)
- 6815.6 GANTSEC-US Coast Guard Greater Antilles Section, PR, calling "Q-0-E" clear and ANDVT, at 0012. (Perron-MD)
- 7373.5 NNN0JCA-US Navy-Marine Corps MARS, with many stations on the South Texas 3X3E emergency net, handling critical hurricane administrative traffic from 1930 until 0100, when they moved to 4011. (Steimel-AR)
- 7419.5 AAR0JN-US Army MARS, OR, working WWJ 98, Federal Highway Administration, Idaho, at 1433. (Bunyan-MO)
- 7461.0 USS *Thorn*-US military vessel for STS-93 mission, at 0227. (Bunyan-MO)
- 7676.0 *Liberty Star*-NASA Booster Recovery Vessel for STS-93, working Cape Radio at 0153. (Bunyan-MO)
- 8240.0 Unid US Coast Guard cutter, given frequency 6474.5 by CAMSLANT, where secure ANDVT was heard, at 0715. (Steimel-AR)
- 8495.3 "S"-Russian Navy CW single-letter marker beacon, at 1047. (Eddy Waters-Australia) *Guess they're still on after all.* -Hugh
- 8837.0 Ben Gurion Airport-El Al Airlines LDOC, passing weather to unid aircraft in Hebrew, at 0058. (Perron-MD)
- 8933.0 Cedar Rapids Dispatcher-Rockwell/Collins LDOC, Iowa, with weather for unid aircraft at 0606. (Steimel-AR)
- 8983.0 CAMSLANT Chesapeake-US Coast Guard, relaying request from Miami Air Ops to Coast Guard 2139, regarding vessel possibly chased by Cubans, at 0037. (Perron-MD)
- 8992.0 Teal 28-US Air Force Reserve "Hurricane Hunter" aircraft, attempting patches through Hickam but not strong enough, at 1047. (Perron-MD)
- 9032.0 Auckland Control-New Zealand aero controller, getting position from Antarctic flight "Ice 1," at 1033. (Waters-Australia)
- 10355.0 4XZ-Israeli intelligence, Tel Aviv, with CW marker at 0244. (Castillo-Panama)
- 10780.0 Stargate-US Air Force JSTARS E-8C training flight, using its back-end callsign instead of usual "Razor," in patch via Cape Radio to Sensor, possibly Cape Canaveral AFS, FL, for data link troubleshooting at 1501. (Allan Stern-FL)
- 10872.2 "S"-Russian Navy CW single-letter marker beacon, at 1013. (Waters-Australia)
- 11045.0 WWJ 85-Federal Highway Administration, Iowa, controlling the Wednesday Federal Agencies Net at 1400. Moved to 13434.0 (FHWA F-42) at 1415, and to 4821 (F-14) at 1430. (Bunyan-MO)
- 11145.0 Unid-English language female, AM numbers in a strange machine voice, ended with all zeroes at 0222. (Steimel-AR) *Russian intelligence, though usually in Spanish. Nice catch.* -Hugh
- 11175.0 SAM 60403-US Air Force C-20C VIP aircraft, working Croughton Global, UK, at 0010. Shadow 91-US Air Force Combat Shadow C-130, with patches to Seminole Ops at 1850. Battlestar-Ohio Air National Guard CP, in patch to aircraft via Andrews AFB, at 1935. Titan 03-KC-130 tanker, in patch to Key West Naval Air Station base ops via Andrews, at 2003. (Stern-FL)
- 11178.0 Falcon 01-Dutch Navy P-3C, with position for PJC, Dutch Navy, Curacao, at 2153. (Perron-MD) Orange Guard-Unknown French-accented English speaker working Dutch naval vessel at 2213. (Ary Boender-Netherlands) *This freq was red-hot all summer with international counternarcotics ops.* -Hugh
- 11693.5 WUE 5-US Army Corps Of Engineers, OH, working WUG using ALE, at 1506. (Bunyan-MO)
- 12122.0 WUE 5-US Army Corps Of Engineers, OH, working WUG 6, MN, after ALE on Channel 11, at 1506. (Bunyan-MO)
- 12714.0 COMSUBLANT-US Navy, with RTTY news and sports bulletins like those on 4487 and 4435, at 0315. (Bunyan-MO)
- 12809.0 UKSUBCAMS-Royal Navy submarine forces, UK, with RTTY weather for all subs, at 0916. (Boender-Netherlands)
- 13495.0 Weird CIA "Counting Station" transmission, using dummy groups with several different, sequential number patterns, at 1400. (Steimel-AR) *CIA test transmission "591;" similar ones were made on all frequencies during the summer.* -Hugh
- 14325.0 VE3PWZ-Canadian amateur in National Hurricane Watch Net, looking for stations in the areas affected by hurricane, at 0023. (Steimel-AR)
- 17461.0 Rome-Italian MFA, with unusually long, online-encrypted, RS-ARQ messages at 1602. (Bob Hall-RSA)
- 18387.0 Devil Fox-US military, calling this frequency "Zulu 280," a new discovery, at 1713. (Jeff Haverlah-TX) *Update the lists!* -Hugh
- 19131.0 Long Horn 911-US Customs aircraft, with patch via Atlas (DEA Comm Center), to Hard Rock concerning arrival at Sand Base, at 1345. (Perron-MD)
- 20390.0 Bravo 92-Unknown US military, calling Cape Radio at 2341. (Bunyan-MO)
- 20407.0 Devil Fox-Unknown US military, called frequency "Zulu 305," another new one for us, at 1720. (Haverlah-TX)
- 20573.0 Rome-Italian MFA, with unusually long, online-encrypted, RS-ARQ messages at 1310. (Hall-RSA)
- 21867.0 Rome-Italian MFA, with unusually long, online-encrypted, RS-ARQ messages at 1410. (Hall-RSA)
- 24210.0 Australian commercial network, several stations at 0420. (Waters-Australia)



## PSK – (Part 2)

In last month's column we profiled a few of the commonly heard PSK (phase shift keyed) HF digital systems, and speculated that the days of standard RTTY and other FSK-based systems may be numbered.

Well, no sooner had we said it, than we heard from a number of European monitors that the well-known Romanian Diplomatic Service (see August 1999 *Digital Digest*) has also been heard using the MIL-188-110A HF modem and MIL-188-141A automatic link establishment (ALE) combination (see last month's column) on a number of its circuits. The old ROU-FEC system, in both 164.5 baud and 213.8 baud modes, remains in operation, however.

This month we examine a powerful new program for helping with identification of these new networks and profile a few more PSK-based systems.

### ■ PC-ALE Opens New Doors

Up until this point, monitors have relied almost extensively on good logbooks, thorough investigation and some lucky hunches to identify the diplomatic networks transitioning to PSK modems. However, now some crucial extra help comes in the form of a new, free software program called "PC-ALE" from UK radio amateur Charles Brain (G4GUO).

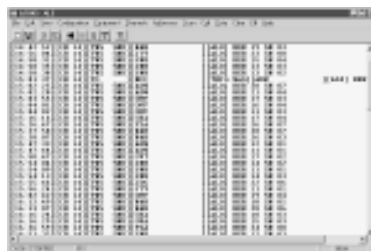
Designed for, and used by some government and military organizations, this very capable program offers anyone the capability to receive and decode MIL-188-141A format ALE transmissions using just about any receiver and a PC equipped with a standard soundcard. In addition, the program offers control of a number of different transceivers making it possible to set up your own ALE-controlled network.

We've been using the program for some time now, and it's safe to say that this is a great addition to the monitor's arsenal, and really does open the doorway to a number of until-now undisturbed networks. Installation is effortless through a commonly used "setup wizard" and operation is as simple as starting up the program and connecting the line output of the receiver to the PC's soundcard input.

Once tuned to the center of the 8-tone ALE signal, PC-ALE automatically synchronizes and decodes the ALE codes, including the all-important station identifiers. In a lot of cases, these identifiers are rather cryptic three letter codes, but a bit of guesswork often helps identify the user. An audio clip of MIL-188-141A ALE is at: <http://rover.wiesbaden.netsurf.de/~signals/WAV/MIL-STD-188-141A.WAV>

Apart from the Swedish and Romanian Dip-

FIG. 1



lomatic Services, PC-ALE shows up in domestic FAA, FEMA, SHARES, USAF and other military networks, plus a few other "exotics" such as the Colombian Navy. Figure 1 shows PC-ALE in action decoding USAF ALE transmissions. You can find Charles' excellent program available for download at:

<http://www.chbrain.dircon.co.uk/pcalc.html>

Here are some frequencies where you can hear ALE activity:

USAF Global High Frequency System (GHFS):  
5708, 6715, 8965, 11226, 13215, 15043, 20631, and 23337 kHz

GHFS station locations are relatively easy to decipher from the ALE identifiers used. For example, Hickam AFB, Hawaii, uses ALE identifier "HIK".

Swedish Diplomatic Service:

12102, 16102, 16182, and 20960 kHz

Swedish stations use identifiers based upon abbreviated versions of their ITU-registered callsigns. For example, the Swedish Embassy in Guatemala City (callsign SAM94) uses ALE ID "S94".

Colombian Navy: 10609 kHz

The Colombian Navy uses a variety of tactical and geographical ALE identifiers like "RADFEN", "BARRANQUILLA", "GLORIA" and others.

Federal Emergency Management Agency (FEMA): 8083 kHz

PC-ALE is our candidate for "digital monitor's program of the year" simply for its ability to open new horizons to the non-professional listener.

### ■ Russian 1280 bps Offset QPSK System

Analogous in a way to using multiple tones in an FSK system to convey information differently, PSK can exist in a number of configura-

### Key to Abbreviations

AFB	Air Force Base
ALE	Automatic Link Establishment
bd	baud
bps	baud per second
BPSK	Binary PSK
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GHFS	Global High Frequency System
HF	High Frequency (shortwave)
ID	Identity
NATO	North American Treaty Organization
PC	personal computer
PSK	Phase Shift Keying
QPSK	Quaternary PSK
ROU-FEC	Romanian Forward Error Correction
RTTY	Radioteletype
SHARES	Shared Resources
USAF	United States Air Force

tions, varying phase between +180 deg and -180 deg (2PSK, BPSK or Binary PSK), or between 90, 180, 270 and 0 deg (4PSK, QPSK or Quaternary PSK).

This latter system is employed by a network of mysterious systems emanating from Russia. These signals have been logged on over sixty frequencies since late 1995 and can currently be heard on most evenings in the US: 6832.08, 7832.08, 9058.08, 9209.08, 10587.93, and 10909.08 kHz

The exact nature of these systems is unclear, the speculation ranging from an HF-based radar coordination network to a long-range digital telephone network. The systems send data at a speed of 1280 baud per second and exhibit the usual rushing, "white noise" sound of high-speed PSK modems. You can hear an audio clip of the system at:

<http://rover.wiesbaden.netsurf.de/~signals/WAV/CIS1280.WAV>

### ■ NATO MIL-STD-188-203-1A

The NATO system MIL-STD-188-203-1A, a.k.a. TADIL-A, Link-11, or "Alligator," commonly used for radar coordination, tracking, and weapons fire control on HF and VHF line-of-sight links, is another very commonly heard PSK-based system. Link-11 also appears to be one of the beginner's Top Five "mystery" signals due to its distinctive sound, best described as a repetitive "bzzzzzzt, rink, dink, dink, dink," perhaps more ably conveyed by the following audio clip:

<http://rover.wiesbaden.netsurf.de/~signals/WAV/LINK11-2250.WAV>

However described, it's a never-to-be-forgotten sound! This is a complex multi-tone signal made up of a single BPSK modulated doppler tone (to combat distortion), 14 data tones each QPSK modulated, and a synchronization tone.

Until next month, happy PSK or ALE monitoring!



# CIDX Shortwave Listener Survey

In conjunction with Radio Canada International's *Maple Leaf Mailbag*, the Canadian International DX Club announces the Second Annual CIDX Shortwave Listener Survey. Listeners are invited to send in their choice of favourites in the following categories. You can choose up to three choices in each category. If voting for more than one in any category, please list them in order of preference; first, second and third. 1st place votes will receive 3 points; 2nd place, 2 points; and 3rd place, 1 point. Here are the categories:

- 1) Favourite shortwave station (overall)
- 2) Favourite music programme on shortwave
- 3) Favourite feature, current affairs or magazine programme on shortwave
- 4) Favourite mailbag/listener feedback programme on shortwave
- 5) Best news coverage by a shortwave station
- 6) Favourite on-air personality on shortwave
- 7) Favourite DX programme on shortwave

Do not cast votes for more than 3 choices in any of the categories.

Also, although not compulsory, please feel free to submit comments accompanying your choices.

You can submit your entry by one of two methods: 1) Via regular mail, send your entry to: Canadian International DX Club, Listener Survey, 79 Kipps Street, Greenfield Park, Quebec, CANADA J4V 3B1; or 2) By e-mail, send your entry to the following e-mail address, indicating CIDX Listener Survey in the "Subject" line: [ve2shw@yahoo.com](mailto:ve2shw@yahoo.com)

All entries must be received by January 31, 2000. The results will be announced on the *Maple Leaf Mailbag* show on Radio Canada International in the February 13-14, 2000 airings of the programme. Please, only one entry per person. Special certificates of merit will be presented to the number one station or programme in each category.

(Sheldon Harvey, President, Canadian International DX Club; Presenter, CIDX Report on RCI *Maple Leaf Mailbag*)

**ALASKA** [non] On Saturday, October 16, GPR-2 St. Petersburg ran tests of KNLS relays: 1400-1500 UT on 5905 and 9480 kHz; 1700-1800 on 5895 and 7390 kHz, 200 kW each to Russia, Caucasus, Middle East. May be the first relay of KNLS by a European site? (Mikhail Timofeyev, GPR-2, *World Of Radio*) Previously had Far East Russian relays; presumably to be continued if successful (gh)

**AUSTRALIA** RA started a *Timor Hour* for Aussie peacekeeping forces there Oct 4, M-F 1330-1430 UT on 11660, 9445 kHz via Shepparton, with a DJ from an ABC domestic network. Troops preferring classical music were out of luck; fair here, also with greetings from family (gh)

While RA was getting all the media attention for its program to forces in Timor, Australian Defence Forces Radio also served Timor according to its mandate (gh) 11140 USB, Australian Defence Forces R, 0953-1001\*, \*1006-1014\*, \*1014-1058\* – the 1014-1058 segment being the complete broadcast, Monday Oct 4 with huge signal. The 1014 segment was specifically for Timor, and said they would be back next week. Presumably still from the Belconnen military ute site (Terry Krueger, FL, *BC-DX*)

The Darwin complex is in a state of readiness, and can be made operational at very short notice. There are technical personnel employed there to ensure that equipment, antennas, feeders, and control systems are functional. Regular technical tests are made using dummy loads – these tests are not audible externally. The station remains under the direct ownership of the Australian Government – it was not sold off to the new consortium (NTL) as were the HF facilities at Shepparton, Brandon, Katherine, Tennant Creek, and Alice Springs. Current policy is that the site *remains* off the air. It is *possible* that at some future date, the station might be used for RA transmissions and services from other broadcasters. Complex contractual documentation is being prepared at very high level to ensure that the content of such broadcasts is not inconsistent with strategic and political requirements.

Foreign Entities: several unsuccessful approaches have been made to the Government by foreign organisations for leasing of the Darwin facility. This is nothing new. Media reports also refer to a new HF station proposed in outback Australia for the World Radio Missionary Fellowship, of which HCJB is a part. The subject was discussed in a recent edition of *DX Party Line* on HCJB. The site is believed to be near Kununurra, which is in the NE of Western Australia, adjacent to the massive Ord River Dam and mineral region, close to the town of Wyndham. It is also about 500 km south of Darwin.

My own view is that the proposal is somewhat speculative, as it is known that the Government is not in favour of permitting foreign broadcasters to construct HF facilities on Australian territory, nor authorise Australian HF facilities for foreign broadcasts. I do not know who "Ian Williams" is, and my contacts in Government are not aware of the venture! (Bob Padula, *Electronic DX Press*)

David Parkinson, chairman of HCJB's Australian board, was interviewed by Allen Graham on *DXPL* regarding plans for a SW station. HCJB-Au is helping get legislation

passed to allow it to be licensed to broadcast on SW from Australia, and believes they have the support of the major parties. 60% of the world's population could be reached from here. HCJB-Au already has \$750K worth of towers obtained in Victoria for \$30K, and dismantled for easy shipping.

Ian Williams in Victoria already has some curtain antennas on his property and has done propagation/engineering studies. Transmitters would cost about \$400K each, and would take six months to be delivered; it would take at least two years before anything is ready to go on the air. Perhaps six HC-100 transmitters like those in Quito and associated antennas would be installed. God chose the site, he imagines. 200 acres of farm land was donated, and they also hope to get adjoining land from the government (gh)

**AUSTRIA** ORF B-99 English includes the new RCI relay to WNA on 1600-1630 on 17865; followed by Spanish at 1630-1700 (via Wolfgang Büschel)

**BELGIUM** [non] RVI B-99 in English to NAM via Bonaire: 0400 on 11980; 2230 on 13670 (RVI *Radio World*)

**BOLIVIA** Radio A.N.D.E.S. has a new name, R. Maico, from Uyuni, Potosi, now on 4796.5, \*1030 claiming 4745. Also heard at 2310-2400\* with news until 2330 (Rogildo Fontenelle Aragao, Cochabamba, Bolivia, *radioescutas*) I would not be surprised if the real name for the 4795 outlet is Radio Mallku, which in Quechua is Radio Cóndor. The name might be perceived as "maico" – which is nonsensical in Spanish – but not in Quechua. Please bear in mind that the vowel "o" is extraneous to Quechua, whereas "u" is not. The condor is part of the Bolivian national emblem, flag and broadcasting history (remember R El Cóndor, in Oruro), but I do not think "Mallku" has been used by any station so far (Henrik Klemetz, Sweden, *World Of Radio*)

Radio Mosoj Chaski, 3310: Eldon Porter says their current schedule is 0900-1200 and 2200-0100, all in Quechua. "We have a 10 kW transmitter but we are finding we only need to go out at about 6.8 to cover Bolivia well." (Hans Johnson, *Cumbre DX*)

**BRAZIL** Radiodifusora Roraima, Boa Vista, Roraima, 4975, 1520, news in Portuguese, 1630 ID "Radio Roraima, uma emissora do Estado de Roraima," jingle, Brazilian music, fair in daytime (José Francisco Ocaña, Barinas, Venezuela, Club Diexistas de la Amistad) New one from a rare state.

R. Cultura Filadélfia, Foz do Iguaçu, Paraná, on 12209.92, 2 x 6104.96 also audible in slop from 6100 at 2350; female preacher until 0000, then live remote (Jay Novello, NC)

**CANADA** During the A-99 season we had 17765, 17800 and 17820 kHz from RCI in the mornings between 1200 and 1600, but for B-99 the only 16 meter band (mb) frequency is 17710 kHz at 1300-1700 UT, and toward the south (RCI frequency sked via Bill Westenhaver)

**CHILE** Only active SW stations as of mid-October: Christian Voice, Radio Santa Maria (6029.6v) and Radio Esperanza (6090 kHz) and very irregularly, Radio Patagonia Chilena. No trace of Radio Triunfal Evangelica for a long time. Currently the local time is UT -3 (Gabriel Iván Barrera, Argentina, *Cumbre DX*)

*All times UTC; All frequencies kHz; \* before hr = sign on, \* after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; B-99=winter season, Oct-Mar; [non] = Broadcast to or for the listed country, but not necessarily originating there.*

**CHINA** [non] V. of China, clandestine from Taiwan, changed time of morning broadcast on 15280 to 2200-2300 (Fyodor Brazhnikov, Russia, *Cumbre DX*)

**COLOMBIA** The new address for the FARC (Fuerzas Armadas Revolucionarias Colombianas) web site is <http://burn.ucsd.edu/~farc-ep/> I'm sure that most people in Colombia hear the news from the FARC via the mainstream media, rather than via listening to their clandestine radio station. The country has a very media extensive presence on the Internet, with Caracol, RCN and the press all there with up-to-date news (Chris Greenway, UKoGBaNI) So University of California at San Diego is still involved with FARC! (gh) and ELN (Ejército de Liberación Nacional) is now at: <http://www.nadir.org/nadir/initiati/rpl/> (Ludo Maes, Transmitter Documentation Project)

FARC's La Voz de la Resistencia, Bloque Oriental, monitored virtually every day in late Sept, early Oct from the 1130 and 2130 hours. Primarily on 6095 despite WSHB, but some days on 6168v, 6162v, 6195, 6235v, or 6260v. Often jammed by "La Voz del Pueblo" mostly with music (Yimber Gaviria, Cali, *World Of Radio*)

On a visit in August FARC's chief engineer told me there are four other programs besides Bloque Oriental, daily unless otherwise stated, nominally on 6240: Bloque del Sur 1100, 1700, 2130; Comando Conjunto Central at 1300, 2000; Comando Conjunto Occidental, Sun 1300; Zona de Despeje, Caquetá, at 1800 (Rocco Cotroneo, *Play-DX*)

Harmonic on 2900, Ondas de Palo Cabildo, (1450 X 2) at 2240-2302 UT with tropical music, timecheck, ID, 2300 sign-off as coming from the coffee region of North Tolima, national anthem. Great signal; this unofficial community station first observed by Henrik Klemetz in Oct 96.

Harmonic on 2480, R. Viva, (1240 x 2), Pasto, 0630-0710 "Radio Viva 1240 donde se vive la verdadera radio deportiva." Listed in WRTN/99 on 1250. Belongs to Cadena Radial Arce de Colombia (Rafael Rodríguez R., Bogotá)

**COSTA RICA** *Alternative Radio* has new times on RFPI of Wednesday 1600, Saturday 2100. James Bean's *Spiritual Awakening* moved to Sun 1700, UT Mon 0100, 0900, and Sun 2030-2200 now occupied by *Spiritu Sanctus* with "Angelical" music for rest of this quarter only. RFPI is now hooked up to the new power source, which should mean fewer outages, with automatic breakers reset quickly if there is an interruption. Still single phase, and will stay such, but three-phase is available if and when RFPI has equipment requiring it such as higher-powered transmitters.

In Eugene, Oregon, RFPI's *Progressive News* from Monday and Tuesday is relayed weekly on Radio Free Cascadia, 98.5, an unlicensed insurgent collective station. With higher speed internet service coming, will change to MP3 format with better audio quality. RFPI has a need for an old 50 kW MW transmitter, if anyone has one to donate as a tax write-off, so RFPI could convert it to SW, or perhaps use it on the expanded AM band (gh)

**CUBA** RHC is planning to add Russian and German broadcasts by the end of 2000y (Harald Kuhl, *BC-DX*)

**DOMINICAN REPUBLIC** A SW station here is getting rave reviews from shortwave listeners for its music, which is nothing but "bachata." Bachata originated in the lower classes and was looked down upon by professional musicians, for its simple repetitive melodies and malicious macho lyrics, but now bachata has been embraced by some mainstream artists. The station is Radio Villa, la sencilla, on 4960.12, atop a darkness path beyond the Caribbean. We heard it around 0500 UT after VOA São Tomé (gh, *VOA Communications World*) First reported by Jay Novello, NC, at 0010 (*Review of International Broadcasting*)

R. Villa, la sencilla, 4960 kHz, SW reports wanted to Apartado de Correos 804, Santo Domingo. Stn owner, Agr. (short for Agrimensor, meaning Surveyor) Roberto Vargas, who also owns R Cima 100, may wish to find out if distant foreign listeners really notice the ID change from "Cima" to "Villa"? When R Cima surfaced on SW I talked to him on the phone, and when he asked me how to get back to reporters – money was no object, he said – I suggested a QSL-package consisting of a card or a letter, "a pennant or something else." The eventual outcome was a card and a letter, "a pennant and something else" – an anniversary coin and, as an added bonus, a music tape. I think we should flood Surveyor Vargas with letters and friendly messages now that he is asking for listener feedback (Henrik Klemetz, Sweden, *RIB*)

**ECUADOR** R. Oriental, Tena, 4782.32 at 1037 in peppy Andean music wake-up show, often greeting listeners on "4780 onda corta" abroad as well as on 1100 AM; 1043 UT accurate 5:43 timecheck, convocatoria on the need for teachers of English (gh)

Nice signal on 5999.36 Oct 11 at 1050 with responsive rosario. No ID heard at 1100 and into dialog. At 1104, RHC 6000 carrier came on late, and news joined in progress, completely overriding the 5999.36 signal. I assume this was La Voz del Upano in Ecuador, which is known to be off-frequency and is run by the Catholics (gh)

Harmonic on 2880, R. Fenix, (1440 X 2), Latacunga, 1058-1120 ads, IDs, news (Rafael Rodríguez R., Bogotá)

The Pifo airport project is on hold; meanwhile, HCJB is looking at a new transmitter site on the coast near Guayaquil (David Cole, HCJB English head, RN Media Network) See also AUSTRALIA

**FINLAND** YLE B-99 to NAM: 0230-0330 UT 9655 11665 kHz; 1300-1500 17660, 1300-1600 15400 (via Arto Jujunen WWDXC via *BC-DX*) Includes English again at 0300 (John Figliozzi) And 1330?

**GERMANY** DW B99 11 mb schedule, has German at 0800-1355 on 25740 from Wertachtal 500 kW 075 degrees to SAs/SEAs (Andreas Volk, *BC-DX*)

**ICELAND** I visited in July, including the radio station. Ríkisútvarpi is situated in a very modern building, address Efstaleiti 1, 150 Reykjavík. The staff consist of 200 fulltimers plus parttimers.

History: The Icelandic National Broadcasting Service, RUV, was founded in 1930 after legislation was passed granting it a monopoly on broadcasting in Iceland. The Broadcasting Act of 1985 rescinded the monopoly held by RUV.

Licenses for private radio and television may be granted and the Act requires RUV to provide two radio channels and one television channel.

After Mr. Haraldur Jónasson had shown me the studios, Mr. Kristján Benediktsson, the chief engineer, joined us. Mr. Benediktsson is also a short-wave listener and a radio amateur and was the ideal person to talk about the future of shortwave transmissions, which are only in Icelandic. They are mainly dedicated to Icelandic sailors all over the world who should be informed what's going on in Iceland. They are broadcast via antennas of the Icelandic post which are located on the shore of the island. There are plans to reduce the shortwave programs considerably and to put more value to the transmissions via Internet.

I told Mr. Benediktsson that such plans would have considerable consequences, as only a few shortwave listeners have access to Internet and the listening of programs via Internet is rather expensive and on the other hand there will be no more incentive to listen to a program on the air.

Additionally I made the cautious proposal if it would not be possible to transmit a short program in English during the shortwave program, at least with the most important information about Iceland. This would enable shortwave listeners from all over the world to get a better knowledge about Iceland and also to write reception reports. Additionally this would be relatively cheap, as such an English information program is currently being broadcast for tourists on FM. I was told there should be a greater demand from the listeners in order to put more weight on the necessity for such a change and secondly the management of RUV has to be convinced about the urgent wish of the listeners.

It would be advisable to write a letter or email to the management of the station to request:

1. Not to shrink the shortwave programs
2. At least to integrate an information program in English into the shortwave transmissions.

To support this initiative write a letter to the following two members of the station's management:

1. Mr. Markus Antonsson, Director General of RUV
2. Mrs. Dora Ingvadóttir, Director of Radio, E-Mail address: [dorai@ruv.is](mailto:dorai@ruv.is)

I hope that many DXers will take the opportunity to express their opinion by writing to these addresses. Refer to my visit 13th July 1999 and my talks to Mr. Jónasson and Mr. Benediktsson.

RUV on shortwave: News broadcasts to Europe from December 1998 are from 1215 to 1300 on 13865 and 15775 kHz, and from 1855 to 1930 on 5055, 7735 and 9275. To America are between 1410 and 1440 on 11402 and 13860, between 1935 and 2010 on 11402 and 13860 kHz and finally between 2300 and 2335 on 9275 and 11402. Longwave broadcasts on 189 kHz and 207 kHz 24 hours daily all year round. You can also listen to brief news in Icelandic on the Internet at: <http://this.is.ruv/> And the home page of RUV is at: <http://www.ruv.is> Real Audio Radio Program 2 at: <http://www.ruv.is/utvarp/ras2.htm> The broadcasts are in Icelandic only! (Volker Willschrey, Saar)

**ISRAËL** Kol Israel B-99 English:

UT	0500-0515	kHz	9435	11605	17545
	1130-1135		15640	17535	
	1500-1530		15650	17535	
	2000-2030		9435	11605	15640 15650

Reshet Bet's evening prime time (Eastern Time) Hebrew frequencies will be 7545, 9390, 11585 and *not* the problematic 7495 (Daniel Rosenzweig, also via George J. Poppin)

**KURDISTAN** Voice of the People of Kurdistan, clandestine, 6980 at 1705-1715+ news items in presumed Kurdish with Western classical music bridge in between, move from 6985, fair signal on clear channel, parallel to 4060.2 which was weak (Mike Barraclough, UK)

**MADAGASCAR** Tamil Broadcasting Corporation, London, 17495, 1230-1325 immediately following Tamil Oli. At 1320 had Sinhala news and a bit of English before cut off (Mahendra Vaghjee, Mauritius)

**MEXICO** No thanks to BBC, which arrogantly chose to broadcast on XEPPM's frequency 6185 last spring, but Radio Educación finally had its frequency free of BBC during prime time 0200-0500, as BBC Delano moved to 6135 earlier than scheduled for B-99, noted already Oct 13. Unfortunately, XEPPM audio was rather distorted, and there may be some weaker co-channel remaining, Brazil? Will some other major broadcaster find 6185 irresistible this winter? (gh)

After a long persuasion campaign, Dr. Julián Santiago Díez de Bonilla and Héctor García Bojorge tested in the last half of October separate SW broadcasts on R. Mil, 6010, which normally simulcasts MW 1000 – with their DX program *Encuentro DX* which once appeared on XERMx. Unfortunately, most of the airings were in the daytime, but perhaps this continues to appear, one UT hour later, now that DST is over: Thu 1500, 2200; Fri 1600, 2300; Sat 1330, 2100; Sun 0130, 1400, 2300; Mon 0200. Reports were wanted to XEOI, Radio Mil Onda Corta, Apartado Postal 21-1000, 04021 - México 21, D.F. (García, *Mundo Radial*)

## Review of International Broadcasting Online

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**MONGOLIA** Besides a number of Russian 2nd and 4th harmonics between 23250 and 24150 during the local afternoon, I also heard V. of Mongolia in English at 1200 on 24170, a second harmonic (Guido Schotmans, Belgium, *hard-core-dx*) So fundamental in Oct was back on 12085 ex-12015, and 12085 confirmed here, weak with heavy flutter (gh, OK)

**MYANMAR** Radio Myanmar, 5985.8 finally heard in English after years of trying. This one is daily in the Western US, but the trick is getting it to hang in long enough to catch the English service that starts at 1430, something I was never able to do before. 1429 man singing and chanting with chorus replying. 1433 into English suddenly with frequency announcements by woman and then playing old pops, such as the Beatles. As for other Burmese services, 4725 apparently signed off at 1330; can anyone confirm this as their normal sign off? Also, still no sign of 5973 (Hans Johnson, AZ, *Cumbre DX*)

**NEW ZEALAND** RNZI's frequency synthesizer stuck on 17675, preventing use of any other frequency for a few weeks, even after 0700 (gh) This has proved to be a blessing in disguise as reception in the Pacific has been very good and also into Asia and Europe. So it has been decided that 9700 from 0700 until close-down will be dropped and RNZI will stay on 17675 to 1005\* until the end of Mar 2000 (Barry Hartley, R New Zealand, *BC-DX*) Tsk, tsk, 9700 was so reliable for us in NAM, but who cares about us? (gh)

**NORWAY** Antenna problems will prevent the use of 11 meters this winter as previously planned. (Olav Grimdalen, NTA, via Joe Hanlon) Sob, may be the only season that band would work

**OMAN** Radio Sultanate of Oman heard on a Sunday at 1400 in English to Europe, 1430 full news. Good signal but low level hum (Mike Barraclough, England) "R. Sultanate of Oman English FM" at 1400-1500 on 15140, with //15375 but weaker. (Erik K  ie, Denmark, *BC-DX*) R. Oman on 15140, 1400-1500 in English - "A big hello and welcome to our listeners in Europe." 15140 announced now, in //90.4 and 91.3 FM. (Dr Matthias Zwoch, Germany, A-DX via *BC-DX*) 15140 is blocked here by HCJB, 15375 by WEWN, both in Spanish (gh, OK)

**PAKISTAN** On the R. Pakistan website the slow-speed English newscasts as well as English at 1600-1615 are gone. The so-called World Service, in Urdu and English (English segments not specified), has changed considerably:

0500-0700	Gulf/ME	11725	15175	17555
0615-0700	SEAs	21730	17705	
0800-1100	WEu/UKoGBaNI	15530	17835	
1330-1530	Gulf/ME	11570	15170	15465
1700-1900	WEu/UKoGBaNI	11570	15335	

A separate page on news gives these times for English on the domestic service: 0300, 1100, 1400, 1600. We know that English has previously been reported at 1400 on 11570 (gh)

Some observations on Radio Pakistan Oct 16 following the military coup: news in English noted 0800 on 17835 but weak and studio to transmitter link went off a couple of times, did not check whether 15530 was on at that time. News in English noted 1100-1105 on 15530 and 17835, both very good levels. This was followed by news in Baluchi and sign off 1112. Checked 11570 for 1400 English news, strong signals but news was in Urdu. The 1600-1615 news in English followed by news commentary is still on, noted today with strong signals on 11570 and 15465, weak on 15320. 1700-1900 World Service confirmed on 11570 and 15335, again strong signals, news bulletins at 1700 and 1800 were both in presumed Urdu (Mike Barraclough, Letchworth, UK)

**PERU** R. Coremarca, 5645.6 at 2350-0132 with vernacular music, UT-5 timecheck; at 0000 *Buenas Noches, Bambamarca*; 0100 program *La Voz de la Liberaci  n*, 0132 off the air without sign-off. Henrik Klemetz comments that Coremarca or Koremarca was mentioned several years before on Radio Bambamarca as a tribe that lived in this region of Peru before Spanish colonization (Rafael Rodr  guez R., Colombia)

Arequipa SW bandscan during a visit there: 5959.3v R. Arequipa is currently operated by "Movimiento Misionero Mundial" with full time religious programming 1000-0300. Also ID as "Radio Arequipa Bethel." Studio/office at Avenida Uni  n No. 215, 3er piso, Distrito Miraflores, Arequipa. [probably meant to say 5949.3v]

5995.3 R. Melod  a, Arequipa runs for 24 hours a day. Former outlets on 5015, 6034 and 6055 are off (Takayuki Inoue Nozaki, Japan, back from Peru, *Cumbre DX*)

**PHILIPPINES** FEBC English 0000-0200 on new 15175 ex-15450; 50 kW, 275 degrees to SE Asia; and will stay on 15175 for B-99 (Ivo Ivanov, Bulgaria, *Observer*) Amended timings for *DX Dial* over FEBC Manila: 0030 and 0200 Sats in *Mornings at Studio Ten* (formerly *Good Morning From Manila*) 15175 for India, SEAs; 0940 Sats 11635 for China, SE Asia; between 1330 and 1430 Wed on *Nitelite* (formerly *Good Evening Asia*) 11995 for India, SEAs; 1425 Suns 11995 for India, SEAs (Peter McIntyre, FEBC, *Electronic DX Press*)

**RUSSIA** *Bless My Soul, O Lord!* - masterpieces of Orthodox music is a new Voice of Russia series for the Millennium continuing in 2000y on the 2nd and 4th Fridays (VOR website via Maryanne Kehoe, swl@qth.net) Try to find the exact times and frequencies on the site <http://www.vor.ru>

**SEYCHELLES** FEBA announced that it would begin broadcasts in "Specialized English" in November, using a simple vocabulary of 1,500 words and spoken at a slow rate of 90 words per minute. One guess as to where they got the idea. In fact, an FEBA employee spent a few days with VOA Special English. Specialized English will be broadcast by FEBA to the Middle East, and by FEBC Philippines to China. There is a web site devoted to this project: <http://www.special.english.net> (Kim Elliott, VOA *Communications World* via John Norfolk)

**SOMALIA** Radio Mogadishu, Voice of People had last been heard in May on 6980. In October it was back on 6750 where it was in Feb. Good 1530-1900\* in Somali only, mentioning Mohamed Aydid many times. Religious program was at 1745-

1800. (Mahendra Vaghjee, Mauritius, *World Of Radio*)

**SUDAN** [non] Voice of Sudan broadcasts on behalf of the National Democratic Alliance (NDA), an umbrella group opposed to the current Sudanese government. Believed to broadcast from studios and transmitters in Asmara, Eritrea. Jammed by a co-channel relay of music or the Sudanese radio's General Programme from Omdurman. Alternative frequencies: 9000, 10000, 12000 kHz; frequency usage may vary. Contact: NDA, PO Box 23703, London SW5 9WS; Tel: +44 (0)1344-874123; Fax: +44 (0)1344-628077 URL: <http://www.umma.org/nda/sudan.htm> (RealAudio available) URL: [http://members.xoom.com/nda\\_soa/](http://members.xoom.com/nda_soa/) E-mail: [sudanvoice@umma.org](mailto:sudanvoice@umma.org) Daily to ME/ Af on 8000v: 0400-0600 Arabic with news 0400-0420, occasionally in English; 1330-1530 Arabic; 1600-1800 Arabic, with news 1600-1620, occasionally in English, on 8000v and 12004v (BBC Monitoring)

**SWITZERLAND** [non] R. 510 International is a monthly so it "floats" around the WBCQ 7415 schedule (Al Weiner, WBCQ) The name could be the equivalent of some significant Roman numerals. If not, it should be (gh) I tried every name under the sun, but I just couldn't come up with anything that suited me. Some of the names that I had in mind were Radio Relay International, Swiss Relay International and Radio World Relay. Finally, I came up with Radio 510 International Relay - named after my postbox! Believe it or not, but some people think that I'm broadcasting on 510 kHz. But then again, it is an odd name for a station, isn't it? ... Address: Radio 510 International, P.O. Box 510, 4010 Basel, Switzerland (DJ Stevie, Webpage R. 510 International via Hans-Joachim Koch)

**TURKEY** Various Turkey locals *not heard* - tried various times in the day for 6325, 6900, 7101, 7370: these were not heard, but had been from the same hotel earlier this year (Don Nelson, Haifa, Israel, *Cumbre DX*)

**USA** October 1 was an important day for the Voice of America. The United States Information Agency, VOA's former parent agency, ceased to exist. USIA was since 1952 a multi-media agency for the purpose of "telling America's story to the world." Most of USIA's functions have been folded into the U.S. State Department, a result of legislation that reduced U.S. government spending on foreign affairs. But it was agreed that international broadcasting should not be absorbed into the State Department. And, so, the U.S. Broadcasting Board of Governors became a separate U.S. government agency. Under the BBG is the International Broadcasting Bureau, which includes the Voice of America, Worldnet-TV, and Radio and TV Marti. Also under the BBG are the corporations Radio Free Europe/Radio Liberty and Radio Free Asia.

Radio Free Europe/Radio Liberty announced that its broadcast archives and corporate records will be housed at the Hoover Institution on War, Revolution and Peace at Stanford University in California. These materials cover the period from the early 1950s until 1995, when RFE/RL moved from Munich to Prague. The broadcast archives include 61,000 reels of broadcast tapes and 7.5 million pages of scripts. This collection is separate from the archives of the RFE/RL Research Institute, which are housed at the Central European University in Budapest. (Kim Elliott, VOA *Communications World* via John Norfolk)

*Talk to America* featured the second appearance of new VOA Director Sandy (never 'Sanford') Ungar. He acknowledged criticism of his first appearance that he came off "like a dufus," but emphasized that times and frequencies were not part of his day to day job, and that he does know a lot about programming and policy. VOA is not under control of the State Department, but is an independent federal agency; nevertheless, Editorials reflecting the opinion of the US Government will continue; they are *not* written by people on the VOA staff (gh)

ABC *Perspective* is on AFRTS USB Sundays at 1206, on all or some of: 4278.5 6458.5 12689.5 (Rod Williams, GA, *Review of International Broadcasting*) including original thought-provoking essays by Hugh Downs; 20/20 and other ABC-TV soundtrack rereads (gh)

New program stated on WBCQ 7415 in mid-Oct, *The Real Amateur Radio Show*, Sat 2330-2400 [now UT Sun 0030]. Hosted by Mr. Mike and the Timtron, the program will talk about all amateur radio topics, from the hams to the pirates. First guest was FCC enforcer Riley Hollingsworth. Another addition was *Marion's Attic*, little old lady playing Edison cylinders, Tue 2030-2100 [now 2130 if still on] (Al Weiner, WBCQ Central, *World Of Radio*) In the half-hour before it, the neo-Nazi *British-Canadian Viewpoint* (Fred Waterer, *DX Ontario*)

WGTV is no longer a Christian station but plans to become a fully commercial station. WGTV will change its call letters as part of this process. (Dave Frantz, WGTV via *Cumbre DX*) WGTV has a deposit in hand to build a third 50,000 watt [sic] sideband transmitter, and two antennas to fill the gap to the northeast and east, for a total of six (Dave Frantz, WGTV, *World Of Radio*)

WTJC, Newport NC, began regular broadcasting in late Sept on 9370.8v, available for every hour except 1100 when WYFR was on 9370.0; always accompanied by unidentified RTTY QRM (gh)

*World Of Radio*: additional time, perhaps temp, on WWCR is UT Mon 0130 on 3215.

**WALES** [non] Wales Radio International is a new client of Merlin with weekly half-hour from Sept on A-99 frequencies: Fri 2030 on 7235, UT Sat 0200 on 9795 to NAM, 1230 on 17650 (Joe Hanlon, PA, *World Of Radio*) The last two well-heard here; they have a contest through next August for a trip to Wales (gh) A project devised by Presell R in association with public and private sector partners in to raise awareness of heritage, culture, music and economic base of Wales. *Celtic Notes* is on the air via Merlin Network One, Skelton and Rampisham, UKoGBaNI changed for B-99:

Fri	2030-2100	6010	Eu
Sat	0200-0230	9755	NAM
Sat	1230-1300	17650	Pac

(via Kai Ludwig, *BC-DX*)

*Until the Next, Best of DX and 73 de Glenn!*



# Broadcast Loggings



Gayle Van Horn

## 0000 UTC on 4649

BOLIVIA: Radio Santa Ana. Spanish. Station ID with echo effect to nice Andean music. Bolivians audible include: tentative on **Radio San Miguel** 4925, 2234-2245; **Radio Centenario** 4854.9, 2300-2315; **Radio La Cruz del Sur** 4875, 2315-2330; **Radio Illimani** 4945, 2330-2340; (Michael Schnitzer, Hassfurt, Germany/*Hard Core DX*)

## 0003 UTC on 6050

ECUADOR: HCJB. Spanish service, // 15140. (Sue Wilden, Noblesville, IN) English service, *Inspirational Classics* 17660, 2030. (Bob Fraser, Cohasset, MA) <[www.hcjb.org](http://www.hcjb.org)>

## 0015 UTC on 9737.4

PARAGUAY: Radio Nacional. Spanish. Sports commentary for Paraguay vs Ecuador (soccer?) to "Radio Nacional de Paraguay" ID at 0021. (Harold Frodge, Midland, MI)

## 0053 UTC on 15240

ITALY: RAI. News item on the end of conscription and a proposed new Italian army of professionals, // 9675, 11800. (Fraser, MA) 0110, 15240 with IDs and features in Spanish. (Wilden, IN) <[www.raiinternational.rai.it/radio/oc/radoc](http://www.raiinternational.rai.it/radio/oc/radoc)> - ed.

## 0135 UTC on 4960.1

DOMINICAN REP: Radio Villa. Monitored to 0203 with Latin and Caribe tunes, to oldies pops. Identification both as "Radio Villa, La Censilla" [*sencilla?-ed*] and most often as "Radio Villa, La Censilla, la emisora del pueblo." Top of the hour included mention of Santo Domingo. (Frodge, MI) New station's ID "esta es HIAH, Radio Villa, La Censilla de Santo Domingo, Republica Dominicana," has replaced Radio Cima 100. (Anker Petersen, Denmark/*HCDX*)

## 0250 UTC on 4845

GUATEMALA: Radio Ke'kci (tent) Closing bits of station sign-off, mentions of Guatemala. Two more tentative loggings of Guatemala's **Radio Tezulutan** 4835, 0255; **La Voz de Nahuala** 3360.5, 0326. (Daniele Canonica, Switzerland)

## 0310 UTC on 9370

USA: WTJC (Working Till Jesus Comes) Station identifying as "Fundamental Broadcasting Network." Recheck 0630 with continuous religious music to "canned" programming relay. (Erich Bergmann, Ansbach, Germany/*HCDX*)

## 0320 UTC on 4830

VENEZUELA: Radio Tachira. Spanish. Hysterical evangelists' fire and brimstone sermon to closing prayer. SINPO=24432. **Ecos del Torbes** 4980, 0333 salsa music to "Ecos Del Torbes" ID. (Klaus Elsebusch, Marienthal, Germany/*HCDX*)

## 0359 UTC on 6955.5

PERU: Radio Paraton. Spanish. Peppy vocals with a hint of Andean music to male's "Radio Paraton" ID at 0400. All music all the time except for ID breaks. (Frodge, MI) Peru's **Radio Union** 6115, 0620 with regional ads and jingles to 0635 fade out. (Gehrig, Spain/*HCDX*) **Radio Tarma** 4774.95, 0500 with sports commentary and jingles. (Ruud Vos, Utrecht, Netherlands/*HCDX*)

## 0445 UTC on 4895

BRAZIL: Campo Grande. Evening show with jingle, IDs and phone-in. (Sam Wright, Biloxi, MS) Brazil's "Radio Tupi, Sistema Universo da Comunicacao" identification 0858 on 6060, during usual *A Voz da Libertacao* program. Via Henrik Klemetz regarding 6090 & 9565, station here now IDs as "Radio Tupi" not Radio Universo. (Reijo Alapiha, Finland/*HCDX*)

## 0605 UTC on 6010.02

MEXICO: Radio Mil. Spanish. Romantic love ballads to commercials, clear ID at 0606. Poor to fair signal. (Enzio Gehrig, Denia, Spain/*HCDX*) programs now one hour later for winter. -ed.

## 0700 UTC on 15140

PORTUGAL: RDP. Portuguese. Station identification to extended news on Timor and Aussie forces update. SINPO 55544. (Elsebusch, Germany/*HCDX*)

## 1210 UTC on 9570

CUBA: China Radio Int'l. *News of China* featuring item on oil refineries to cut losses but won't make a profit for 1999. Severe QRM from VOA Spanish service on 9565. (Fraser, MA)

## 1240 UTC on 15400

FINLAND: Radio Finland. *Talk Unlimited* includes interview with the director of the Helsinki Zoo, // 17670. (Fraser, MA)

## 1258 UTC on 4000

INDONESIA: RRI Kendari. Indo. National newscast. (Don Nelson, OR/Grayline, WA/*Cumbre DX*) Indo's audible; **RRI Palangkaraya** 3325, 1349-1402; **RRI Ternate** 3345, 1350-1355. (Bruce Churchill, CA/*Cumbre DX*) **RRI Ujung Pandang** 4753.3 // 4925, 2206; **RRI Pontianak** 3976.06 // 4925, 2207; **RRI Medan** 4766, 2255; **RRI Jambi** 4925, 2204. (Walter Mola, Torino, Italy/*Gatflash!*)

## 1345 UTC on 9580

AUSTRALIA: Radio Australia. Report on Australian scientist Mc Farland Burnett, fair signal. (Fraser, MA)

## 1452 UTC on 11715

USA: KJES. Children's bible verse readings to station ID 1501 plus "please let us know if you can hear me!" followed by Spanish scripture recitations. (Wilden, IN)

## 1653 UTC on 5005.3

NEPAL: Radio Nepal. Presumed this station for very weak signal and almost clear channel. Asian music and "chanting" segment. Very weak but nice to see this possible winter fade in. (Mark Veldhuis, Borne, NLD/*HCDX*)

## 1727 UTC on 3365

INDIA: AIR (All India Radio) Opera music to brief English segments. "This is Delhi" ID/time check and world newscast. (Veldhuis, NLD/*HCDX*) **AIR** 15075, 1817 subcontinental music to ID. (Jerry Brookman, Kenai, AK) Andaman & Nicobar Islands-**AIR Port Blair** 4760, 2326-2338 clear ID after English newscast. (Canonica, SU) <<http://air.kode.net>> Real Audio available. -ed.

## 1728 UTC on 5990.5

ETHIOPIA: Radio Ethiopia. Vernacular text to music bridge. Parallels 7110, 9704.2, same signal strength, considerably increased interference. (Veldhuis, NLD/*HCDX*) No website, address for reports, c/o External Service, P.O. Box 654, Addis, Ababa, Ethiopia. -ed.

## 1743 UTC on 5009.5

MADAGASCAR: RTV Malagasy. Announcer's Malagasy text to instrumental song. Brief announcement and Afro pop tune decreasing in signal quality. (Veldhuis, NLD/*HCDX*)

## 1750 UTC on 15475

GABON: Afrique Numero Un. African pop music to French service IDs, 1600-1900 schedule. (Ben Loveless, MI) <[www.africa1.com](http://www.africa1.com)> Send reports to ; Boite Postal 1, Libreville, Gabon -ed.

## 1802 UTC on 3200

SWAZILAND: TWR (Trans World Radio) English religious text to TWR jingle 1815. Intros for additional religious segment with SINPO 24332. (Veldhuis, NLD/*HCDX*) <[www.twr.org](http://www.twr.org)>

## 1807 UTC on 4800

LESOTHO: Radio Lesotho. Religious vernacular text to gospel music. Signal fair to poor. (Veldhuis, NLD/*HCDX*) reports to; P.O. Box 552, Maseru 100, Lesotho. -ed.

## 1829 UTC on 15244.4

CONGO: RTV Congolaise. Nice signal for closing bits of French service music and ID to 1830\*. (Veldhuis, NLD/*HCDX*)

## 2000 UTC on 15650

ISRAEL: Kol Israel. Israel's High Court rules illegal physical pressure on suspects // 11605, 17545. (Fraser, MA) Don't forget all transmissions are now one hour later in winter. -ed.

## 2100 UTC on 9400

BULGARIA: Radio Bulgaria.. Station ID/freq quote. (Zacharias Liangas, Thessaloniki, Greece/*HCDX*) 2300, 9400 // 11700 (Fraser, MA; Wilden, IN) All hour later in winter. -ed

## 22354 UTC on 5047

TOGO: Radio Lome. Easy-listening tunes for English/French vocals. "Radio Lome" ID 0000 and news briefs to 0003. Hour/freq schedule quote to ID/anthem 0004\*. (Frodge, MI; Luis Maillo, Spain/*HCDX*; Vos, NLD/*HCDX*) Tentative on Togo's **Radio Kara** 3222, 2358. (Veldhuis, NLD/*HCDX*)

Thanks to our contributors — Have you sent in YOUR logs?  
Send to **Gayle Van Horn**, c/o Monitoring Times (or e-mail [gayle@grove.net](mailto:gayle@grove.net))  
English broadcast unless otherwise noted.

## Special QSL Cards Available to DXers

On the occasion of Radio Australia's 60<sup>th</sup> anniversary, special QSL cards will be available December 20<sup>th</sup>.

According to an interview by *Feedback* Moderator Roger Broadbent with John Wright of Australian Radio DX-Club and Radio Australia's QSL Manager, all reception reports of Radio Australia's English broadcasts reports will be verified using the old QSL motifs, including the Bell Bird, Kookaburra, Koala and the Sydney Opera House. These nostalgic cards will reach the hobbyists within eight weeks...but hurry, card supply is limited!

The 100<sup>th</sup> anniversary of German Maritime Radio, which began testing from Cuxhaven in 1899, will be celebrated by special simplex broadcasts by the German Weather Forecast Organization. DDH47 will broadcast in Morse code from



Pinneberg near Hamburg, Germany, on 147.3 kHz at 2230 UTC, on December 10<sup>th</sup>, January 14<sup>th</sup>, and February 11<sup>th</sup>. Power 15-5-1-15 kW. Mode CW 100-120 in German, English, French and Italian.

Special QSL cards will be available and should include the RST (readability, strength, tone) code and family name of the radio pioneer which is given during the broadcast. Please include an address label, three German Marks in mint stamps, two

IRCs (international reply coupons) to Europe and three IRCs for all others. Final deadline is March 31st. Station address: Deutscher Wetterdienst, Amateurfunkgruppe DL0SWA, Bernhard-Nocht-Str. 76, D-20359 Hamburg, Germany. Thanks to *Worldwide DX Club* for the tip!

### CANADA

CHNX Halifax, Nova Scotia 6130 kHz. Verification letter signed by Scott Snailham and personal letter. Received for an English report. Station address: 5121 Sackville St., 3<sup>rd</sup> Floor, P.O. Box 400, Halifax NS, B3J 2R2 Canada. (Daniele Canonica, Switzerland)

### IRAN

VOIRI, 11970 kHz. No data photo card of Iranian poet's tomb, plus schedule and four Islamic magazines. Received in one year for an English report and two IRCs. Station address: IRIB External Services, P.O. Box 19395-6767, Tehran, Iran. (Ray Stickney, Northfield, NH)

### MEDIUM WAVE

5 TAB, 1539 kHz AM. Full data card signed by E.G. Gesler. Received in 19 days for a taped report. Station address: Tab Building, Level 1, Pulteney Court, Adelaide 5000, S.A. Australia. (Patrick Martin, Seaside, OR)

CKTA, 1570 kHz AM. Partial data verification letter signed by Georgina Kniel-General Manager. Received in 20 days for an AM report and one US dollar. Station address: 401 Mayor Magrath Dr., Lethbridge, Alberta T1J 3L8 Canada (Patrick Griffith, Federal Heights, CO)

KPPT, 1230 kHz AM. Prepared QSL card verified by Ron Eggert-Program Director. Received in seven days for an AM report. Station address: P.O. Box 456, Newport, OR 97365. (Martin, OR)

KRZX 1660 kHz AM. Verification letter signed by Bob Lauch-General Sales Manager. Received in twelve days for an AM report. Station address: P.O. Box 8093, Waco, TX 76714. (Martin, OR)

KSMH, 1620 kHz AM. Partial data verification letter signed by Tricia Lemmon-Development Manager. Received in 135 days for an AM report and one US dollar. Station address: P.O. Box 180, Tahoma, CA 96142. (Griffith, CO)

LRL 202 Radio Diez, 710 kHz AM. Buenos Aires. Friendly email verification letter from Ruben Gerez-Gerente Tecnico for Spanish report to: [rgerez@impsat1.com.ar](mailto:rgerez@impsat1.com.ar) Their programs are typically Argentine format of folklore music and tangos. They have an FM sister station FM News 98.3. (Paul Ormandy, Oamaru, New Zealand/Cumbre DX)

Radio Tunisienne 963 kHz AM. Full data QSL card signed by Abdesselem Slim. Received in 127 days (after several years of unsuccessful attempts) and two IRCs. Station address: Le Chef de Service du Controle de la Reception de l'Office National de la Telediffusion, O.N.T. Cite Ennassim I-Bourjel, Boite Postal 399/1080, Tunis. Email: [Ont@ati.tn](mailto:Ont@ati.tn) (Enzio Gehrig, Spain/Hard Core DX)

XETOL-Mexico, Toluca 1130 kHz AM. Verification letter signed by Oscar M.

Beltran-Sales Dept., Network Hqtrs. Received in 35 days from a taped report (returned with dollar enclosure). Have attempted to verify this station since 1993. Station address: Corporacion Mexicana De Radiodifusion S.A. DE C.V., Calle Tetitla No. 23, Col. Toriello Guerra, Delegacion Tlalpan, C.P. 14050, Mexico D.F. (Martin, OR)

### PIRATE

Radio Silver, Italy via ARS Andino 6935.2 kHz. Full data QSL card signed by Andy. Received in 209 days for a pirate report and two IRCs. Station address: Via Davanzatti 8, 20158 Milano, Italy. (Nicolas Eramo, Buenos Aires, Argentina) Andino Relay Service may be reached at; Casilla 159, Santiago 14 Chile or via email [arssw@usa.net](mailto:arssw@usa.net). Website: [www.geocities.com/Area51/Shadowlands/4401/andino/html](http://www.geocities.com/Area51/Shadowlands/4401/andino/html) -ed.

### SAO TOME

Voice of America relay, 7290 kHz. Full data *White House* scenery postcard unsigned. Received in six weeks for an English report. Station address: 330 Independence Ave., SW, Washington, DC 20547. Email reports: [qsl@voa.gov](mailto:qsl@voa.gov) Direct reports may be sent to transmitter site with return postage included to: Voice of America/IBB-Sao Tome Relay Station, P.O. Box 522, Sao Tome, Sao Tome e Principe. (Brian Bagwell, St. Louis, MO)

### SYRIA

Radio Damascus, 12085 kHz. Verification letter and QSL card unsigned. Received in 210 days for an English report. New station address: P.O. Box 4702, Damascus, Syria. (Nucio Ribas, Brazil/Cumbre DX)

### UNITED STATES

NAV4, Navy Marine Corps MARS, 14467 kHz USB. Full data Navy/Marine Corps 50<sup>th</sup> *Annual Armed Forces Day* signed by RMCS(SW) Craig Stidahl. Also received *Armed Forces Day* poster. Received in 84 days for an amateur radio traffic report. Station address: Director, Region 4, Navy Marine Corps MARS, 615 Preble Ave., Great Lakes, IL 60088-5705. (Bill Wilkins, Springfield, MO)

NMC, US Coast Guard Communications Area Master Station, Pacific, 4426 kHz USB. Full data computer-generated Eagle's Head card signed by K.R. Harrison-TCI, plus letter and station schedule. Received in 42 days for a utility report and an SASE (not used). Station address: Radioman-in-Charge, USCG CAMPSPAC NMC, P.O. Box 560, Pt. Reyes, CA 94956-0560. (Wilkins, MO)

WEWN, 11875 kHz. Full data card, sticker, newsletter and frequency schedule. Received in 24 days for an English report. Station address: 1500 High Road, P.O. Box 176, Vandiver, AL 35176. (Anthony Maslanka, Cleveland, OH)

WWBS, 11900 kHz. Full data prepared card signed by Jo Ann Josey, blue WWBS/world certificate map and a personal note from the veri signer. Received in 194 days for an English report. Station address: P.O. Box 18174, Macon, GA 31209. (Wilkins, MO)

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## HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af  
 ① ② ⑤ ③ ④ ⑥ ⑦

### Convert your time to UTC.

Broadcast time on Å and time off Å are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Standard Time) 5, 6, 7, or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each page.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC *Sunday* will be heard on *Saturday* evening in America (in other words, 7:30 pm Eastern, 6:30 pm Central, etc.).

### Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on Å, then alphabetically by country Å, followed by the station name Å. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not *daily*, the days of broadcast Å will appear in the column following the time of broadcast, using the following codes:

#### Day Codes

s Sunday  
 m Monday  
 t Tuesday  
 w Wednesday  
 h Thursday  
 f Friday  
 a Saturday

In the same column Å, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

### Choose the most promising frequencies for the time, location and conditions.

The frequencies Å follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports

from her monitoring team and *MT* readers to make the Shortwave Guide up-to-date as of one week before publication.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area Å of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

#### Target Areas

af: Africa  
 al: alternate frequency (occasional use only)  
 am: The Americas  
 as: Asia  
 au: Australia  
 ca: Central America  
 do: domestic broadcast  
 eu: Europe  
 me: Middle East  
 na: North America  
 om: omnidirectional  
 pa: Pacific  
 sa: South America  
 va: various

### Consult the propagation charts.

To further help you find a strong signal, we've included a chart on page 64 which takes into account conditions affecting the audibility of shortwave broadcasts. Simply pick out the section of the chart for the region in which you live and find the line for the region in which the station you want to hear is located. The chart indicates the optimum frequencies (in megahertz-MHz) for a given time in UTC. (Users outside North America can use the same procedure in reverse to find best reception from North America.)

### Choose a program or station you want to hear.

Some selected programs appear on the lower half of the page for prime listening hours – space does not permit 24-hour listings. Our program manager changes the stations and programming featured each month to reflect the variety available on shortwave, though BBC programs are almost always included.

Occasionally program listings will be followed by "See X 0000." This information indicates that the program is a rerun, and refers to a previous summary of the program's content. The capital letter stands for a day of the week, using the same day codes as in the frequency listing (see above), and the four digits represent a time in UTC.

## MT MONITORING TEAM

Gayle Van Horn  
 Frequency Manager  
[gayle@grove.net](mailto:gayle@grove.net)

Jim Frimmel  
 Program Manager  
[frimmel@star-telegram.com](mailto:frimmel@star-telegram.com)

Jacques d'Avignon  
 Propagation Forecasts  
 Ontario, Canada  
[monitor@rac.ca](mailto:monitor@rac.ca)

Mark Fine, VA  
[fineware@erols.com](mailto:fineware@erols.com)

Dan Roberts, CA

## PROGRAM HIGHLIGHTS

### JIM FRIMMEL, PROGRAMMING MANAGER

- Selected programs this month feature the **BBC World Service**, the **Eternal Word Network's Catholic Radio Service (WEWN)**, and **Radio Netherlands**.

*Pushing Back the Curtain*, a six-part BBC series that traces the fall of Communism can be heard in the Americas stream beginning Sunday, November 14th at 0530 UTC and repeated Mondays at 1830 and Tuesdays at 0230. Another BBC four-part special is *Christianity at the Crossroads*, which can be heard Tuesdays at 1130 and 1830, Wednesdays at 0230, and Fridays at 1530.

- A last minute update from Radio Netherlands announced some special weekly documentaries for December.

On International AIDS Day (Dec 1st), Eric Beauchemin travels to Zimbabwe where the capital city's main morgue is kept open 24 hours a day for the constant stream of AIDS-related deaths.

Helene Michaud presents a two-part series to round off the millenium. She looks back at events around the year 1000 in part I and talks to scientists in part II about the year 2000.

In other Radio Netherlands developments, some program changes have occurred and are reflected in this month's listing. *Dutch Horizons* replaces *Sounds Interesting* and is presented by Bertine Krol, a new voice in the English Service. Dheera Sujana is back from India to host *The Sound Fountain*, a replacement for *Aural Tapestry*. The European co-produced program *Weekend* also disappears from the new lineup. *The Way I See It* slot changes to a Sunday four-minute program preview called *The Week Ahead*, during which Howard Shannon updates us on the coming week's schedule.

- New shortwave station WTJC of Newport, North Carolina, can now be heard 23 hours a day on 9370 kHz. The poor frequency choice puts the transmissions below the 31 meter band, too low for reception on many receivers. The complete program production is of a religious nature from the Fundamental Broadcasting Network (FBN), a Baptist organization. We'll make room for a program schedule next month.



## FREQUENCIES

0000-0100	Anguilla, Caribbean Beacon	6090am				0000-0030	UK, BBC World Service	3915as	11945as		
0000-0100 vl	Australia, ABC/Katherine	5025do				0000-0100	UK, BBC World Service	5965as	5970sa	5975am	6175am
0000-0100 vl	Australia, ABC/Tent Creek	4910do						6195as	9410as	9590am	9915sa
0000-0100	Australia, Radio	9660pa	12080va	15240pa	17580va			11955as	12095sa	15310as	15360as
		17750as	17795va	21740va				17790as			
		7375na	9400na					9355va			
0000-0100	Bulgaria, Radio	7375na				0000-0100 vl	UK, IBC Tamil	3985eu	6180eu	7165eu	
0000-0015	Cambodia, Natl Radio Of	11940as				0000-0100 f	UK, Merlin Network One	5810na			
0000-0100	Canada, CBC N Quebec Svc	9625do				0000-0100	USA, KAJL Dallas TX	7555na			
0000-0100	Canada, CFRX Toronto	6070do				0000-0100	USA, KJES Vado NM	7510na			
0000-0100	Canada, CFVP Calgary	6030do				0000-0100	USA, KTVN Salt Lk City UT	17510as			
0000-0100	Canada, CHNX Halifax	6130do				0000-0100	USA, KWHR Naalehu HI	7215as	9770as	11760as	15185as
0000-0100	Canada, CKZN St John's	6160do				0000-0030	USA, Voice of America	15290as	17735as	17820as	
0000-0100	Canada, CKZU Vancouver	6160do						5995am	6130ca	7405am	9455af
0000-0029	Canada, Radio Canada Intl	5960na	9755na			0000-0100 twfha	USA, Voice of America	9775am	11695ca	13740am	
0000-0029 twfha	Canada, Radio Canada Intl	6040na	9535am	11865am				7415na			
0000-0100	Costa Rica, RF Peace Intl	6975va	15050va	21460va		0000-0100	USA, WBCQ Monticello ME	5825na	13615na		
0000-0100	Ecuador, HCJB	9745na	12015na	21455na		0000-0100	USA, WEWN Birmingham AL	5085va	6890am		
0000-0030	Egypt, Radio Cairo	9900am				0000-0100	USA, WGTG McCaysville GA	7580na			
0000-0100 vl	Guatemala, Radio Cultural	3300do				0000-0100	USA, WHRA Greenbush ME	5745na	7315na		
0000-0100	Guyana, GBC/Voice of	5950do				0000-0100	USA, WHRI Noblesville IN	11950am			
0000-0045	India, All India Radio	7410as	9705as	9950as	11620as	0000-0100	USA, WINB Red Lion PA	7490na			
		13625as				0000-0100	USA, WJCR Upton KY	9955am			
0000-0100	Japan, Radio/NHK	6155eu	6180eu	9665af	11705na	0000-0100	USA, WRMI/R Miami Intl	7355na			
		11815as	13650as			0000-0100	USA, WRNO New Orleans LA	7535na	9430am	15285ca	
						0000-0100	USA, WSHB Cypress Crk SC	9370am			
0000-0100	Kiribati, Radio	9810do				0000-0100	USA, WTJC Newport NC	3215na	5070na	5935na	7435na
0000-0100	Liberia, LCN/R Liberia Int	5100do				0000-0100	USA, WWCN Nashville TN	6085na	9505na		
0000-0100	Malaysia, Radio	7295do				0000-0100	USA, WYFR Okeechobee FL	4960do			
0000-0100	Malaysia, RTM Sarawak	7160do				0000-0030 vl	Vanuatu, Radio	4010do	4050do		
0000-0100 vl	Malaysia, RTM Kota Kinabalu	5980do				0010-0020	Kyrgyzstan, Kyrgyz Radio	6240eu			
0000-0030	Mexico, Radio Mexico Intl	9705am				0015-0045 as	Armenia, Trans World R	6155eu	6180eu	9665af	11705na
0000-0100	Namibia, NBC	3270af	3289af			0015-0045 as	Japan, Radio/NHK	6240as			
0000-0100	New Zealand, R NZ Intl	17675va				0015-0045 as	Monaco, Trans World Radio	9022am	9795ca	11970na	
0000-0100	North Korea, R Pyongyang	3560am	11845am	13650am	15230am	0030-0100	Iran, VOIRI	6165na	9845na		
0000-0100 vl	Papua New Guinea, NBC	9675do				0030-0100	Netherlands, Radio	5020do			
0000-0100	Philippines, FEBC R Intl	15175as				0030-0100 vl	Solomon Islands, SIBC	6005as	9730as	15425as	
0000-0100	Russia, IBC Tamil	9355as				0030-0100	Sri Lanka, Sri Lanka BC	9655as	11905as	15395na	
0000-0100	Singapore, R Corp Singapore	6150do				0030-0100	Thailand, Radio	6195as	17615as		
0000-0100	Spain, R Exterior Espana	6055na				0050-0100	UK, BBC World Service	9675na	11800na	15240na	
0000-0030	Thailand, Radio	9655af	9690af	11905af							

## SELECTED PROGRAMS

## Daily

- 0000 UK, BBC London (am/as/eu): The World Today. The World Service breakfast program.
- 0000 UK, BBC London (as): World News. Broadcast on the hour of 5, 10, or 15 minutes in length.
- 0030 Netherlands, Radio: News. Bulletin of world news at the start of all programs.

## Monday-Friday

- 0030 USA, WEWN Birmingham AL: Franciscan University Connection. Father Michael Scanlon and guests speak from Steubenville, Ohio.
- 0045 USA, WEWN Birmingham AL: Precious Blood Litany. Prayer.

## Tuesday-Saturday

- 0025 Netherlands, Radio: Press Review. See Mon-Fri 1225.
- 0030 Netherlands, Radio: News. See S 0030.
- 0038 Netherlands, Radio: Newslines. See Mon-Fri 1138.
- 0055 UK, BBC London (am/eu): My Century. See M 0030.

## Sundays

- 0000 USA, WEWN Birmingham AL: Sunday Mass (encore) (from 2200). From Our Lady of the Angels Monastery.
- 0005 UK, BBC London (as): From Our Own Correspondent. BBC correspondents comment on the background to the news.
- 0025 Netherlands, Radio: Insight. Rob Green looks at what made the news in the past seven days.
- 0030 UK, BBC London (am/eu): Science Extra. Either Soundbyte (virtual games and the Internet) or Seeing Stars (a look at the night skies).
- 0030 UK, BBC London (as): Agenda. This series examines the latest ideas and trends.
- 0030 USA, WEWN Birmingham AL: Scandal of the Cross and Its Triumph. Bob and Penny Lord examine heresies that have rocked the church through the ages.
- 0038 Netherlands, Radio: Europe Unzipped. New! Radio Netherlands' look at events in Europe.

- 0045 UK, BBC London (am/eu): Waveguide (4). The latest information on international broadcasting with reviews of receivers and news about reception.
- 0045 UK, BBC London (am/eu): Write On. Air your views about World Service; write to PO Box 76, Bush House, Strand, London WC2B 4PH.
- 0054 Netherlands, Radio: The Sound Fountain. Dheera Sujan returns from India to co-host this new program with Miche Ernsting (replacing "Aural Tapestry" and "Weekend").

## Mondays

- 0000 USA, WEWN Birmingham AL: Catholic History in the U.S.. Father Charles Conner surveys the growth and development of the Catholic Church in the United States.
- 0005 UK, BBC London (as): Health Matters. Keeps track of new developments in the world of medical science, as well as ways of keeping fit.
- 0025 Netherlands, Radio: The Week Ahead. See S 1225.
- 0030 Netherlands, Radio: News. See S 0030.
- 0030 UK, BBC London (am/eu): My Century. Moments from individuals' lives throughout the 20th century (5 or 30 mins).
- 0030 UK, BBC London (as): Brain of Britain 1999. See S 0430.
- 0037 Netherlands, Radio: Sincerely Yours. See S 1138.
- 0055 Netherlands, Radio: Dutch Horizons. See S 1154.

## Tuesdays

- 0000 USA, WEWN Birmingham AL: To Tell You the Truth. See M 0430.
- 0005 UK, BBC London (as): Discovery. In-depth look at scientific research.
- 0030 UK, BBC London (am/eu): Health Matters. See M 0005.
- 0030 UK, BBC London (as): Pick of the World. See S 1530.
- 0054 Netherlands, Radio: Research File. See M 1153.

## Wednesdays

- 0000 USA, WEWN Birmingham AL: St. Francis - Mirror of Christ. Father Andrew Apostoli discusses St. Francis and his teachings.
- 0005 UK, BBC London (as): One Planet. Charles Haviland and

- Richard Black host this new program about development and the environment.
- 0030 UK, BBC London (am/eu): Discovery. See T 0005.
- 0030 UK, BBC London (as): Sports International. Live commentaries and interviews, features and discussions.
- 0053 Netherlands, Radio: Music 52-15. See T 1153.

## Thursdays

- 0000 USA, WEWN Birmingham AL: Our Lady in Scripture and Tradition. This series draws from the rich teachings found in scripture and tradition about Mary and her many apparitions (Fr. Andrew Apostoli).
- 0005 UK, BBC London (as): The Works. Alun Lewis looks at the impact of tomorrow's technology.
- 0030 UK, BBC London (am/eu): The Works. See W 0005.
- 0030 UK, BBC London (as): Assignment. A weekly examination of a topical issue.
- 0053 Netherlands, Radio: The Weekly Documentary. See W 1153.

## Fridays

- 0000 USA, WEWN Birmingham AL: Holy Spirit in Our Lives. See M 0430.
- 0005 UK, BBC London (as): Science in Action. The latest in science and technology.
- 0030 UK, BBC London (am/eu): The Works. See H 0005.
- 0030 UK, BBC London (as): Focus on Faith. Alison Hilliard talks to church leaders about their hopes for the future.
- 0054 Netherlands, Radio: Media Network. See H 1153.

## Saturdays

- 0005 UK, BBC London (as): Waveguide (4). See S 0045.
- 0005 UK, BBC London (as): Write On. See S 0045.
- 0020 UK, BBC London (as): Variable Feature. See S 0530.
- 0030 UK, BBC London (am/eu): Science in Action. See F 0005.
- 0030 UK, BBC London (as): People and Politics. Background to the British political scene.
- 0030 USA, WEWN Birmingham AL: The Carpenter Shop. See M 0430.
- 0053 Netherlands, Radio: A Good Life. See T 1253.

## FREQUENCIES

0100-0200	Anguilla, Caribbean Beacon	6090am				0100-0200	Spain, R Exterior Espana	6055na			
0100-0200 vl	Australia, ABC/Katherine	5025do				0100-0200	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0100-0200 vl	Australia, ABC/Tent Creek	4910do				0100-0130	Switzerland, Swiss R Intl	9885am	9905am		
0100-0200	Australia, Radio	9660pa	12080va	15240pa	15415as	0100-0200	UK, BBC World Service	5965as	5975am	6175am	6195as
		17580va	17750as	17795va	21740va			9410as	9590am	9915am	11955as
0100-0200	Canada, CBC N Quebec Svc	9625do						12095va	15280as	15310as	15360as
0100-0200	Canada, CFRX Toronto	6070do				0100-0200 f	UK, Merlin Network One	17790as			
0100-0200	Canada, CFVP Calgary	6030do				0100-0200	Ukraine, Radio	3985eu	6180eu	7165eu	
0100-0200	Canada, CHNX Halifax	6130do						5905eu	6020eu	6030na	6080eu
0100-0200	Canada, CKZN St John's	6160do						7205eu	7420eu	9560eu	9610eu
0100-0200	Canada, CKZU Vancouver	6160do						9785na	9810va		
0100-0156	China, China Radio Intl	9570na				0100-0200	USA, KAIJ Dallas TX	5810na			
0100-0200	Costa Rica, RF Peace Intl	6975va	15050va	21460va		0100-0200	USA, KJES Vado NM	7555na			
0100-0200	Cuba, Radio Havana	6000na	9820na	11705na	13605na	0100-0200	USA, KTVN Salt Lk City UT	7510na			
0100-0127	Czech Rep, R Prague Intl	7345na	9665na			0100-0200	USA, KWHR Naalehu HI	17510as			
0100-0200	Ecuador, HCJB	9745na	12015na	21455va		0100-0200	USA, Voice of America	7115as	7200as	9635as	11705as
0100-0145	Germany, Deutsche Welle	6040na	6145am	9640am	9700na			11725as	11820as	15250as	17740as
		9760na						17820as			
0100-0200 s	Germany, Good News World	9855eu				0100-0130 twfha	USA, Voice of America	5995am	6130am	7405am	9455af
0100-0130 s	Germany, Universal Life	9495as						9775am	13740am		
0100-0130 m	Germany, V O Deliverance	9855na				0100-0200	USA, WBCQ Monticello ME	7415na			
0100-0200	Germany, Overcomer Ministr	9835eu				0100-0200	USA, WEWN Birmingham AL	5825na	13615na		
0100-0200 vl	Guatemala, Radio Cultural	3300do				0100-0200	USA, WGTG McCaysville GA	5085va	6890am		
0100-0200	Guyana, GBC/Voice of	5950do				0100-0200	USA, WHRA Greenbush ME	7580na			
0100-0200	Indonesia, Voice of	9525va				0100-0200	USA, WHRI Noblesville IN	5745na	7315na		
0100-0130	Iran, VOIRI	9022am	9795ca	11970na		0100-0200	USA, WINB Red Lion PA	11950am			
0100-0110	Italy, RAI Intl	9675na	11800na	15240na		0100-0200	USA, WJCR Upton KY	7490na			
0100-0200	Japan, Radio/NHK	9660me	11860as	11870me	15570as	0100-0200	USA, WRMI/R Miami Intl	9955am			
		15590as	17685pa	17835sa	21670pa	0100-0200	USA, WRNO New Orleans LA	7355na			
0100-0200	Kenya, Kenya BC Corp	4885do				0100-0200	USA, WSHB Cypress Crk SC	7535na	9430am	15285ca	
0100-0130	Kiribati, Radio	9810do				0100-0200	USA, WTJC Newport NC	9370am			
0100-0200	Liberia, LCN/R Liberia Int	5100do				0100-0200	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0100-0200	Malaysia, Radio	7295do				0100-0200	USA, WYFR Okeechobee FL	6065na	9505na		
0100-0200 vl	Malaysia, RTM KotaKinabalu	5980do				0100-0130	Uzbekistan, R Tashkent	7190as	9375as	9530as	9715as
0100-0200	Namibia, NBC	3270af	3289af			0100-0127	Vietnam, Voice of	7250va			
0100-0200	New Zealand, R NZ Intl	17675va				0115-0145 vl	Libya, Voice of Africa	15235va	15415va	15435va	
0100-0200 vl	Papua New Guinea, NBC	9675do				0130-0200	Lithuania, Radio Vilnius	9855am			
0100-0200	Philippines, FEBC R Intl	15175as				0130-0200	Slovakia, AWR Europe	11660as			
0100-0130	Serbia, Radio Yugoslavia	9580na	11850eu			0130-0200	Sweden, Radio	9495as			
0100-0200	Singapore, RCorp Singapore	6150do				0130-0200	UK, RTE Radio	6155eu			
0100-0130	Slovakia, R Slovakia Intl	5930na	7300ca	9440sa		0130-0200 twfha	USA, Voice of America	5995am	6130am	9455af	
0100-0200 vl	Solomon Islands, SIBC	5020do				0140-0200	Vatican City, Vatican R	9650au	12055au		
						0145-0200	Albania, R Tirana Intl	6115na	6120al	7160na	

## SELECTED PROGRAMS

## Monday-Friday

0145 UK, BBC London (as): Off the Shelf. Daily readings from the best of world literature.

## Tuesday-Saturday

0100 UK, BBC London (am/eu): The World Today. See S 0000.

0100 UK, BBC London (as): World News. See S 0000.

## Sundays

0100 UK, BBC London (am/as/eu): The World Today. See S 0000.

0100 USA, WEWN Birmingham AL: The Best of Mother Angelica Live. Repeat broadcast of a the TV simulcast.

0125 Netherlands, Radio: Insight. See S 0025.

0130 UK, BBC London (am/eu): Music Review. News and views from the world of music.

0130 UK, BBC London (as): Global Business. Roger White presents this weekly series of interviews, features and discussions with the movers and shakers of the international business community.

## Mondays

0100 UK, BBC London (am/eu): The World Today. See S 0000.

0100 UK, BBC London (as): World News. See S 0000.

0100 USA, WEWN Birmingham AL: Mother Angelica Live (encore). Down to earth (and sometimes humorous) inspiration.

0105 UK, BBC London (as): The Farming World. See S 0415.

0120 UK, BBC London (as): Health Matters. See M 0005.

0125 Netherlands, Radio: The Week Ahead. See S 1225.

0130 UK, BBC London (am/eu): Meridian Feature. A kaleidoscope of events in the world of the arts.

## Tuesdays

0100 USA, WEWN Birmingham AL: Pillars of Faith (live). Bishop D. Foley takes telephone questions about Catholic doctrine.

0105 UK, BBC London (as): Insight. See M 1530.

0120 UK, BBC London (as): Discovery. See T 0005.

0125 Netherlands, Radio: Press Review. See Mon-Fri 1225.

0130 UK, BBC London (am/eu): Westway. The World Service's first-ever regular drama (soap opera) serial.

0145 UK, BBC London (am/eu): Record News. See M 0415.

## Wednesdays

0100 USA, WEWN Birmingham AL: Mother Angelica Live Family Night. A simulcast of the TV program.

0105 UK, BBC London (as): Insight. See M 1530.

0120 UK, BBC London (as): One Planet. See W 0005.

0125 Netherlands, Radio: Press Review. See Mon-Fri 1225.

0130 UK, BBC London (am/eu): Variable Feature. See S 0530.

## Thursdays

0100 USA, WEWN Birmingham AL: Mother Angelica Live. See M 0100.

0105 UK, BBC London (as): Insight. See M 1530.

0120 UK, BBC London (as): The Works. See H 0005.

0125 Netherlands, Radio: Press Review. See Mon-Fri 1225.

0130 UK, BBC London (am/eu): Meridian Live. See W 0430.

## Fridays

0100 USA, WEWN Birmingham AL: Life on the Rock (live). Join Jeff Cavins and his weekly guest as they meet at a coffee house to discuss the joys and challenges of being a young Christian in the 90's.

0105 UK, BBC London (as): Insight. See M 1530.

0120 UK, BBC London (as): Science in Action. See F 0005.

0125 Netherlands, Radio: Press Review. See Mon-Fri 1225.

0130 UK, BBC London (am/eu): Westway. See T 0130.

0145 UK, BBC London (am/eu): Performance. John Stearne explores each week one of the great voices of the century.

## Saturdays

0100 USA, WEWN Birmingham AL: The Journey Home (live). See W 1500.

0105 UK, BBC London (as): The Edge (hour 1) (EAs). The first hour of a two-hour show of music, chat and humor, aimed at younger listeners (hosted by Kirsten O'Brien and Steve Merchant).

0125 Netherlands, Radio: Press Review. See Mon-Fri 1225.

0130 UK, BBC London (am/eu): Meridian Books. See H 0430.

0130 UK, BBC London (as): Brain of Britain 1999. See S 0430.

## FREQUENCIES

0200-0300	Anguilla, Caribbean Beacon	6090am				0200-0300	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0200-0300 twfha	Argentina, RAE	11710am				0200-0300	Taiwan, Radio Taipei Intl	5950na	9680na	11740na	11745va
0200-0300 vl	Australia, ABC/Katherine	5025do						11825pa	15345as		
0200-0300 vl	Australia, ABC/Tent Creek	4910do				0200-0300	UK, BBC World Service	5975am	6175am	9770af	9915va
0200-0300	Australia, Radio	9660pa	12080va	15240pa	15415as			11955as	12095va	15280as	15310as
		15515va	17580va	17750as	21725pa			17790as			
0200-0210	Bangladesh, Bangla Betar	4880as				0200-0300	USA, KAIJ Dallas TX	5810na			
0200-0300	Canada, CBC N Quebec Svc	9625do				0200-0230	USA, KJES Vado NM	7555na			
0200-0300	Canada, CFRX Toronto	6070do				0200-0300	USA, KTBN Salt Lk City UT	7510na			
0200-0300	Canada, CFVP Calgary	6030do				0200-0300	USA, KWHR Naalehu HI	17510as			
0200-0300	Canada, CHNX Halifax	6130do				0200-0300	USA, Voice of America	4960af	7115as	7200as	9635as
0200-0300	Canada, CKZN St John's	6160do						11705as	11725as	11820as	15250as
0200-0300	Canada, CKZU Vancouver	6160do						17740as	17820as		
0200-0300	Canada, Radio Canada Intl	6155am	9535am	9755am	9780am	0200-0300	USA, WBCQ Monticello ME	7415na			
		11865am				0200-0300	USA, WEWN Birmingham AL	5825va			
0200-0300	Costa Rica, RF Peace Intl	6975va	15050va	21460va		0200-0300	USA, WGTG McCaysville GA	5085va	6890am		
0200-0205	Croatia, Croatian Radio	7280al	9925na			0200-0300	USA, WHRA Greenbush ME	7580na			
0200-0300	Cuba, Radio Havana	6000na	9820na	11705na	13605na	0200-0300	USA, WHRI Noblesville IN	5745na	7315sa		
0200-0227	Czech Rep, R Prague Intl	6200na	7345na			0200-0300	USA, WINB Red Lion PA	11950am			
0200-0300	Ecuador, HCJB	9745na	12015na	21455va		0200-0300	USA, WJCR Upton KY	7490na			
0200-0300	Egypt, Radio Cairo	9475na				0200-0300	USA, WRMI/R Miami Intl	9955am			
0200-0245	Germany, Deutsche Welle	7285as	9615as	9765as	11965as	0200-0300	USA, WRNO New Orleans LA	7355na			
0200-0300	Guyana, GBC/Voice of	5950do				0200-0300	USA, WSHB Cypress Crk SC	5850na	7535ca	9430na	
0200-0230	Hungary, Radio Budapest	9835na				0200-0300	USA, WTJC Newport NC	9370am			
0200-0300	Kenya, Kenya BC Corp	4935do				0200-0300	USA, WWCR Nashville TN	3215na	5070na	5935na	7435na
0200-0300	Malaysia, Radio	7295do				0200-0300	USA, WYFR Okeechobee FL	6065na	9505na		
0200-0230	Myanmar, Radio	7185do				0215-0220	Nepal, Radio	3230as	5005as		
0200-0300	Namibia, NBC	3270af	3289af			0230-0300	Albania, R Tirana Intl	6115na	6120al	7160na	
0200-0300	New Zealand, R NZ Intl	17675va				0230-0300	Austria, R Austria Intl	7325na			
0200-0300 vl	Papua New Guinea, NBC	9675do				0230-0300	Finland, YLE/R Finland	9655na	11665na		
0200-0256	Romania, R Romania Intl	9510na	9570na	11725au	11740na	0230-0245	Pakistan, Radio	9640as	11930as	15455as	15485as
		11810as	17735as					17660as	17895as		
0200-0300	Russia, Voice of Russia WS	7180na	12050na	15520na	15595na	0230-0300 vl	Philippines, R Pilipinas	11885as	15120as	15270as	
0200-0300	Singapore, R Corp Singapore	6150do				0230-0300	Sweden, Radio	7290na			
0200-0300 vl	Solomon Islands, SIBC	5020do				0230-0257	Vietnam, Voice of	7250va			
0200-0300	South Korea, R Korea Intl	7275as	11725sa	11810sa	15575na	0250-0300	Vatican City, Vatican R	7305am	9605am		

## SELECTED PROGRAMS

## Daily

0200 UK, BBC London (af/am/as/eu): The World Today. See S 0000.

## Sundays

0200 USA, WEWN Birmingham AL: St. Joseph Radio Presents (encore). A discussion of Catholic beliefs and practices for all denominations.  
0230 UK, BBC London (af): In Praise of God. Weekly programme of worship and meditation.  
0230 UK, BBC London (am/eu): Agenda. See S 0030.  
0230 UK, BBC London (as): In Praise of God. See S 0230.

## Mondays

0200 USA, WEWN Birmingham AL: Introduction to Mariology. See S 1630.  
0230 UK, BBC London (af): Variable Music Feature. Different features of 15, 30, and 45 minutes length with a musical theme.  
0230 UK, BBC London (am/eu): Pick of the World. See S 1530.  
0230 UK, BBC London (as): Everywoman. See S 1130.

## Tuesdays

0200 USA, WEWN Birmingham AL: Truth Talks. Deal Hudson of Crisis Magazine and his guests discuss relevant issues, including ethics, charity and democracy.  
0230 UK, BBC London (AE): Pushing Back the Curtain (7th, 14th, 21st). See A 2330.  
0230 UK, BBC London (af): Brain of Britain 1999. See S 0430.  
0230 UK, BBC London (am/eu): Variable Feature. See S 0530.  
0230 UK, BBC London (as): John Peel. Tracks from newly released albums and singles from the contemporary music scene.

## Wednesdays

0200 USA, WEWN Birmingham AL: Our Father's Plan. Dr. Scott Hahn and Jeff Cavins lead an in-depth study of God's relationship to man throughout Biblical history.  
0230 UK, BBC London (AE): Christianity at the Crossroads (1st, 8th, 15th, 29th). See M 1430.  
0230 UK, BBC London (af): Everywoman. See S 1130.  
0230 UK, BBC London (am/eu): Variable Feature. See S 0530.  
0230 UK, BBC London (as): The Vintage Chart Show. See M 0530.

## Thursdays

0200 USA, WEWN Birmingham AL: LiveWire (live). Live call-in program.  
0230 UK, BBC London (af): Variable Feature. See S 0530.  
0230 UK, BBC London (am/eu): Everywoman. See S 1130.  
0230 UK, BBC London (as): Variable Music Feature. See M 0230.

## Fridays

0200 USA, WEWN Birmingham AL: Faith and Family (encore). See H 1600.

0230 UK, BBC London (af): Andy Kershaw's World of Music. See W 0530.  
0230 UK, BBC London (am/eu): Focus on Faith. See F 0030.  
0230 UK, BBC London (as): Andy Kershaw's World of Music. See W 0530.

## Saturdays

0200 UK, BBC London (as): World News (EAs). See M 1100.  
0200 USA, WEWN Birmingham AL: Off the Shelf. A weekly program with lively interviews of authors and others on topics important to the life and mission of the Catholic Church.  
0205 UK, BBC London (as): The Edge (hour 2) (EAs). The second hour of a two-hour show of music, chat and humor, aimed at younger listeners.  
0230 UK, BBC London (af): Jazzmatazz. See S 1630.  
0230 UK, BBC London (am/eu): People and Politics. See A 0030.  
0230 UK, BBC London (as): Composer of the Month. See M 1530.  
0250 USA, WEWN Birmingham AL: Register Radio. See M 0430.

## THANK YOU...

## ADDITIONAL CONTRIBUTORS TO THIS MONTH'S SHORTWAVE GUIDE:

*Benelux; British DX Club; DX-Antwerp*; John Babbis, Silver Spring, MD; Joe Brashier/WHRI; Bob Fraser, Cohasset, MA; Harold Frodge, Midland, MI; Ivan Gushin, Ont Canada; Glenn Hauser, Enid, OK/*World of Radio, DX Report, Review Of Int'L Broadcasters*, Hans Johnson/Ulis Fleming/*Cumbre DX/DXing With Cumbre*; Bill Olson, Augusta, GA; Al Quaglieri/*NASWA Journal*; George Woods/*Media Scan*; Bob Padula, Victoria, Australia/*EDXP*; Giovanni Serra/*The Four Winds*; Clayton Sherman, Hoosick Falls, NY; BBCM; *BBC On-Air*; *DX Ontario*; *Gatflash!*; *Hard Core DX*; *New Zealand DX Times*; *Nordic SW Center*; Radio Netherlands/*Media Network*; Radio Sweden/*Media Scan*; Usenet Newsgroups; *World Wide DX Club*.



0300-0400	Anguilla,Caribbean Beacon	6090am				0300-0400	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
0300-0400 vl	Australia, ABC/Katherine	5025do				0300-0400	Taiwan, Radio Taipei Intl	5950na	9680na	11745as	11825as
0300-0400 vl	Australia, ABC/Tent Creek	4910do						15345as			
0300-0400	Australia, Radio	9660pa	12080as	15240pa	15415as	0300-0330	Thailand, Radio	9655am	11905am	15395na	
		15515va	17580va	17750as	21725pa	0300-0400	Uganda, Radio	4976do			
0300-0330 mvfa	Belarus, R Minsk	7210va	11670va			0300-0400	UK, BBC World Service	3255af	5975am	6005af	6135am
0300-0400 vl	Botswana, Radio	4820do	7255do					6190af	6195eu	7160af	11730af
0300-0400	Bulgaria, Radio	375na	9400na					11760me	11765af	11955as	12095af
0300-0400	Canada, CBC N Quebec Svc	9625do						15280as	15310as	17790as	21660as
0300-0400	Canada, CFRX Toronto	6070do				0300-0400	USA, KAIJ Dallas TX	5810na			
0300-0400	Canada, CFVP Calgary	6030do				0300-0400	USA, KTBN Salt Lk City UT	7510na			
0300-0400	Canada, CHNX Halifax	6130do				0300-0400 vl	USA, KVOH Los Angeles CA	9975am			
0300-0400	Canada, CKZN St John's	6160do				0300-0400	USA, KWHR Naalehu HI	17510as			
0300-0400	Canada, CKZU Vancouver	6160do				0300-0330 smtwh	USA, Voice of America	4960af			
0300-0329	Canada, Radio Canada Intl	6155na	9755na	9780na		0300-0400	USA, Voice of America	6080af	6115af	7105af	7275af
0300-0356	China, China Radio Intl	9690na	11765na					7290af	9575af	9885af	
0300-0400	Costa Rica,RF Peace Intl	6975va	15050va			0300-0400	USA, WBCQ Monticello ME	7415na			
0300-0305	Croatia, Croatian Radio	7280al	9925na			0300-0400	USA, WEWN Birmingham AL	5825va			
0300-0400	Cuba, Radio Havana	6000na	9820na	11705na	13605na	0300-0400	USA, WGTG McCaysville GA	5085va	6890am		
0300-0400	Ecuador, HCJB	9745na	12015na	21455va		0300-0400	USA, WHRA Greenbush ME	7580na			
0300-0330	Egypt, Radio Cairo	9475am				0300-0400	USA, WHRI Noblesville IN	5745na	7315sa		
0300-0330	Finland, YLE/R Finland	9655na	11665na			0300-0400	USA, WINB Red Lion PA	11950am			
0300-0345	Germany, Deutsche Welle	6045na	9535na	9640na	9700am	0300-0400	USA, WJCR Upton KY	7490na			
		11750na				0300-0330	USA, WRMI/R Miami Intl	7465am			
0300-0400	Germany,Overcomer Ministr	11710eu				0300-0400	USA, WRNO New Orleans LA	7395na			
0300-0310 mtwhf	Greece, Voice of	7450na	7475na	9375na	9420na	0300-0400	USA, WSHB Cypress Crk SC	5850na	7535eu		
0300-0400 vl	Guatemala, Radio Cultural	3300do				0300-0400	USA, WTJC Newport NC	9370am			
0300-0400	Guyana, GBC/Voice of	5950do				0300-0400	USA, WWCN Nashville TN	3215na	5070na	5935na	7435na
0300-0400	Japan, Radio/NHK	17825ca	21610pa			0300-0400	USA, WYFR Okeechobee FL	6065na	9505na		
0300-0400	Kenya, Kenya BC Corp	4885do	4935do			0300-0310	Vatican City, Vatican R	7305am	9605am		
0300-0400 vl	Lesotho, Radio	4800do				0300-0400	Zambia, Natl BC Corp	6165do	6265do		
0300-0400	Malaysia, Radio	7295do				0300-0400 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0300-0400	Malaysia, Voice of	6175as	9750as	15295as		0310-0315 thfa/vl	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0300-0325	Moldova, R Moldova Intl	7520am				0310-0340	Vatican City, Vatican R	9660af			
0300-0400	Namibia, NBC	3270af	3289af			0329-0359 sm	Canada, Radio Canada Intl	6155na	9755na	9780na	
0300-0400	New Zealand, R NZ Intl	17675va				0330-0400	Hungary, Radio Budapest	9835na			
0300-0330	Pakistan, Radio	6070do				0330-0350 vl	Libya, Voice of Africa	15235va	15415va	15435va	
0300-0400 vl	Papua New Guinea, NBC	9675do				0330-0400 vl	Philippines, R Pilipinas	13770as	15330as	17730as	
0300-0330 vl	Philippines, R Pilipinas	11885as	15120as	15270as		0330-0400	Sweden, Radio	9495na			
0300-0400	Russia,Voice of Russia WS	7180na	9665na	12020na	15520na	0330-0400	Tanzania, Radio	5050af			
		15595na				0330-0400	UAE, Radio Dubai	12005na	13675na	15400na	
0300-0330	S Africa, AWR Africa	6015af				0330-0400	USA, WRMI/R Miami Intl	7465am			
0300-0330 vl	S Africa, Channel Africa	9525af				0330-0357	Vietnam, Voice of	9830va			
0300-0400	Singapore,RCorp Singapore	6150do				0359-0400	Zambia, Christian Voice	6065do			

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0500-0600	Anguilla,Caribbean Beacon	6090am				0500-0600	Spain, R Exterior Espana	6055na			
0500-0600 vl	Australia, ABC/Katherine	5025do				0500-0505	Swaziland, Trans World R	3200af	4775af		
0500-0600 vl	Australia, ABC/Tent Creek	4910do				0500-0530	Switzerland, Swiss R Intl	9655eu			
0500-0600	Australia, Radio	9660pa	12080va	15240pa	15515va	0500-0600	Uganda, Radio	4976do			
		17580va	21725pa			0500-0600	UK, BBC World Service	3255af	3955eu	5975va	6005af
0500-0600 as	Australia, Radio	17750as						6175va	6190af	6195va	7160af
0500-0600 vl	Botswana, Radio	4820do	7255do					9410va	9740as	11760me	11765af
0500-0600	Canada, CBC N Quebec Svc	9625do						11955pa	12095eu	15240af	15280as
0500-0600	Canada, CFRX Toronto	6070do						15310as	15360as	17640af	17760as
0500-0600	Canada, CFVP Calgary	6030do						17790as			
0500-0600	Canada, CHNX Halifax	6130do				0500-0600	USA, KAIJ Dallas TX	5810na			
0500-0600	Canada, CKZN St John's	6160do				0500-0600	USA, KTVN Salt Lk City UT	7510na			
0500-0600	Canada, CKZU Vancouver	6160do				0500-0600 vl	USA, KVOH Los Angeles CA	9975am			
0500-0600	Costa Rica,RF Peace Intl	6975va	15050va			0500-0600	USA, KWHR Naalehu HI	17780as			
0500-0600	Cuba, Radio Havana	9550na	9820na	9830na		0500-0600	USA, Voice of America	5970af	6035af	6080af	7170af
0500-0600	Ecuador, HCJB	9745na	12015na	21455va				7195af	9630af	11965me	12080af
0500-0545	Germany, Deutsche Welle	6100am	6120na	9670na	11795na			15205va			
0500-0600	Germany,Overcomer Ministr	9425eu				0500-0600	USA, WBCQ Monticello ME	7415na			
0500-0600	Guyana, GBC/Voice of	5950do				0500-0600	USA, WEWN Birmingham AL	5825va			
0500-0515	Israel, Kol Israel	9435va	11605va	17535au		0500-0600	USA, WGTG McCaysville GA	5085va	6890am		
0500-0600	Japan, Radio/NHK	6110na	7230eu	11715as	11760as	0500-0600	USA, WHRA Greenbush ME	7435af			
		11840as	11850pa	15230pa	15590as	0500-0600	USA, WHRI Noblesville IN	5745na	7315sa		
		17825na				0500-0600	USA, WINB Red Lion PA	11950am			
0500-0600	Kenya, Kenya BC Corp	4885do	4935do			0500-0600	USA, WJCR Upton KY	7490na			
0500-0600	Kuwait, Radio	15110va				0500-0600	USA, WYFR New Orleans LA	7395na			
0500-0600 vl	Lesotho, Radio	4800do				0500-0600	USA, WSHB Cypress Crk SC	7535eu	9840af	12020af	
0500-0600	Liberia,LCN/R Liberia Int	5100do				0500-0600	USA, WTJC Newport NC	9370am			
0500-0510 vl/m-f	Malawi, MBC	5993do				0500-0505	USA, WWCR Nashville TN	2390na	5070na	5935na	
0500-0600	Malaysia, Radio	7295do				0500-0505 as	USA, WWCR Nashville TN	3210na			
0500-0600	Malaysia, RTM Sarawak	7160do				0500-0505 mtwhf	USA, WWCR Nashville TN	3215na			
0500-0600	Malaysia, Voice of	6175as	9750as	15295as		0500-0600	USA, WYFR Okeechobee FL	5985na	9355na	11550eu	
0500-0530 twhfa	Mexico, Radio Mexico Intl	9705am				0500-0520	Vatican City, Vatican R	9660af	11625af	15570af	
0500-0600	New Zealand, R NZ Intl	17675va				0500-0600	Zambia, Christian Voice	6065do			
0500-0600 vl	Nigeria, Radio/Ibadan	6050do				0500-0600	Zambia, Natl BC Corp	6165do	6265do		
0500-0600 vl	Nigeria, Radio/Kaduna	4770do				0500-0530 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
0500-0600	Nigeria, Radio/Lagos	3326do				0505-0600 mtwhf	Swaziland, Trans World R	4775af	6100af	9500af	
0500-0600	Nigeria, Voice of	7255af	15120va			0505-0600	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0500-0600	North Korea, R Pyongyang	11710am	13790am			0515-0555 vl	Honduras, HRMI	5890am			
0500-0504	Pakistan, Radio	9645do				0520-0530	Vatican City, Vatican R	9660af	11625af	15570af	
0500-0600 vl	Papua New Guinea, NBC	9675do				0525-0600	Ghana, Ghana BC Corp	3366do	4915do		
0500-0600	Russia,Voice of Russia WS	7125na	9665na	12050na	15425na	0530-0600	Austria, R Austria Intl	6015na	6155va	13730na	15410eu
		15455na	15465na	15495na	15595na	0530-0600	Kiribati, Radio	9810do			
		17565na	17630na	17660na	17690na	0530-0600 a	Kyrgyzstan, Kyrgyz Radio	4010do	4050do		
0500-0530	S Africa, AWR Africa	5960af				0530-0600	Serbia, Radio Yugoslavia	9580na	11850eu		
0500-0600 vl	S Africa, Channel Africa	15215af				0530-0600	Thailand, Radio	9655eu	11905eu	15445eu	
0500-0600	Singapore,RCorp Singapore	6150do				0530-0600	UAE, Radio Dubai	15435au	17830au	21700au	
0500-0600 vl	Solomon Islands, SIBC	5020do				0530-0600 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		

## SELECTED PROGRAMS

0500 UK, BBC London (af/am/as/eu): The World Today.  
See S 0000.

0500 USA, WEWN Birmingham AL: The Best of Mother  
Angelica Live. See S 0100.

0530 UK, BBC London (AE): Pushing Back the Curtain  
(5th,12th,1930). See A 2330.

0530 UK, BBC London (af): Agenda. See S 0030.

0530 UK, BBC London (am/eu): Variable Feature. Special  
features and new series.

0530 UK, BBC London (as): Westway Compilation Edition.  
Catch up on the week's episodes of the World  
Service's drama serial.

0500 UK, BBC London (af/am/as/eu): The World Today. See S 0000.

0500 UK, BBC London (as): The World Today. See S 0000.

0500 USA, WEWN Birmingham AL: The Best of Mother Angelica Live. See S 0100.

0530 UK, BBC London (af): Network Africa. See M 0330.

0530 UK, BBC London (am/eu): Jazzmatazz (Am). See S 1630.

0530 UK, BBC London (as): The Vintage Chart Show. Each week a classic Top 20 from the past with Paul Burnett.

0500 UK, BBC London (af/am/as/eu): The World Today. See S 0000.

0500 USA, WEWN Birmingham AL: The Best of Mother Angelica Live. See S 0100.

0530 UK, BBC London (af): Network Africa. See M 0330.

0530 UK, BBC London (am/eu): The UK Top Twenty (Am). See M 1615.

0530 UK, BBC London (as): The UK Top Twenty. See M 1615.

0500 UK, BBC London (af/am/as/eu): The World Today. See S 0000.

0500 USA, WEWN Birmingham AL: The Best of Mother Angelica Live. See S 0100.

0530 UK, BBC London (af): Network Africa. See M 0330.

0530 UK, BBC London (am/eu): Andy Kershaw's World of Music (Am). Recordings of diverse music from around the world.

0530 UK, BBC London (as): Andy Kershaw's World of Music. See W 0530.

0500 UK, BBC London (af/am/as/eu): The World Today. See S 0000.

0500 USA, WEWN Birmingham AL: The Best of Mother Angelica Live. See S 0100.

0530 UK, BBC London (af): Network Africa. See M 0330.  
0530 UK, BBC London (am/eu): Variable Music Feature  
(Am). See M 0230.  
0530 UK, BBC London (as): Variable Music Feature. See  
M 0230.

0500 UK, BBC London (af/am/as/eu): The World Today. See S 0000.

0500 USA, WEWN Birmingham AL: The Best of Mother Angelica Live. See S 0100.

0530 UK, BBC London (af): Network Africa. See M 0330.

0530 UK, BBC London (am/eu): John Peel (Am). See T 0230.

0530 UK, BBC London (as): Jazzmatazz. See S 1630.

0500 UK, BBC London (af/am/as/eu): The World Today. See S 0000.

0500 USA, WEWN Birmingham AL: The Best of Mother Angelica Live. See S 0100.

0505 UK, BBC London (as): The Edge (hour 2) (SAs). See A 0205.

0530 UK, BBC London (af): Talkabout Africa. See W 1615.

0530 UK, BBC London (am/eu): My Century. See M 0030.

0530 UK, BBC London (as): Brain of Britain 1999. See S 0430.

## FREQUENCIES

0600-0700	Anguilla, Caribbean Beacon	6090am				0600-0700 vl	Solomon Islands, SIBC	5020do			
0600-0700 vl	Australia, ABC/Katherine	5025do				0600-0700 mtwhf	Swaziland, Trans World R	4775af	6100af	9500af	
0600-0700 vl	Australia, ABC/Tent Creek	4910do				0600-0700	UK, BBC World Service	3955eu	6005af	6175va	6190af
0600-0700	Australia, Radio	9660pa	12080va	15240pa	15415as			6195eu	7160af	9410eu	9580pa
		15515va	17580va	17750as	21725pa			9740as	11765af	11940af	11955as
0600-0700 vl	Botswana, Radio	4820do	4830do	7255do				12095eu	15240af	15300as	15360as
0600-0700 vl	Canada, CBC N Quebec Svc	9625do				0600-0700	USA, KAJJ Dallas TX	15575me	17640af	17760va	17790as
0600-0700	Canada, CFRX Toronto	6070do						17885af	21660as		
0600-0700	Canada, CFVP Calgary	6030do				0600-0700	USA, KATN Salt Lk City UT	5810na			
0600-0700	Canada, CHNX Halifax	6130do				0600-0700	USA, KWHR Naalehu HI	7510na			
0600-0700	Canada, CKZN St John's	6160do				0600-0700	USA, Voice of America	17780as			
0600-0700	Canada, CKZU Vancouver	6160do				0600-0630		5970af	6035af	6080af	7170va
0600-0629 as	Canada, Radio Canada Intl	5960na	6090va	6150eu	9670na			7195af	9630af	9680af	11750af
		9780af	11905af					11805af	11965me	11995af	12080af
0600-0629 mtwhf	Canada, Radio Canada Intl	11710af	13690af	15535af		0600-0700	USA, WBCQ Monticello ME	15205va			
0600-0700	Costa Rica, RF Peace Intl	6975va	15050va			0600-0700	USA, WEWN Birmingham AL	7415na			
0600-0605	Croatia, Croatian Radio	11880au	13820al			0600-0700	USA, WGTG McCaysville GA	5825va			
0600-0700	Cuba, Radio Havana	9550na	9820na	9830na		0600-0700	USA, WHRA Greenbush ME	5085va	6890am		
0600-0700	Ecuador, HCJB	9745na	12015na	21455va		0600-0700	USA, WHRI Noblesville IN	7435af			
0600-0645	Germany, Deutsche Welle	6140eu	7225af	9565af	11785af	0600-0700	USA, WJCR Upton KY	5745na	7315sa		
		17820as	21695as			0600-0700	USA, WRNO New Orleans LA	7490na			
0600-0700	Germany, Overcomer Minist	13810au				0600-0700	USA, WSHB Cypress Crk SC	7395na			
0600-0630	Ghana, Ghana BC Corp	3366do	4915do			0600-0700	USA, WTJC Newport NC	7535af			
0600-0700	Guyana, GBC/Voice of	5950do				0600-0700	USA, WWCR Nashville TN	9370am			
0600-0700 vl	Italy, IRRS	3985va				0600-0700	USA, WYFR Okeechobee FL	2390na	3210na	5070na	5935na
0600-0700	Japan, Radio/NHK	5975eu	7230eu	11740as	11840as	0600-0700 vl	Vanuatu, Radio	5985na	7355eu		
		11850pa	17825na			0600-0620	Vatican City, Vatican R	4960do			
0600-0700	Kenya, Kenya BC Corp	4885do	4935do			0600-0700	Vatican City, Vatican R	4005eu	5883eu		
0600-0700	Kiribati, Radio	9810do				0600-0700	Yemen, Rep of Yemen Radio	9780do			
0600-0700	Kuwait, Radio	15110va				0600-0700	Zambia, Christian Voice	9865do			
0600-0700 vl	Lesotho, Radio	4800do				0600-0700	Zambia, Natl BC Corp	6165do	6265do		
0600-0700	Liberia, LCN/R Liberia Int	5100do				0600-0700 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0600-0700	Malaysia, Radio	7295do				0610-0615 mtwhf	Greece, Voice of	7430eu	7450eu	9375eu	9420eu
0600-0700	Malaysia, RTM Sarawak	7160do				0630-0700	Austria, R Austria Intl	6015na			
0600-0700	Malaysia, Voice of	6175as	9750as	15295as		0630-0700	Georgia, Georgian Radio	11805eu			
0600-0700	Namibia, NBC	7165af				0630-0700 mtwhfa	Malta, VO Mediterranean	7155eu			
0600-0700	New Zealand, R NZ Intl	17675va				0630-0700	Switzerland, Swiss R Intl	9655eu			
0600-0700 vl	Nigeria, Radio/Ibadan	6050do				0630-0700 as	UK, BBC World Service	17885af			
0600-0700 vl	Nigeria, Radio/Kaduna	4770do				0630-0700	USA, Voice of America	7170af	9680af	11805af	11965me
0600-0700	Nigeria, Radio/Lagos	3326do						15205va			
0600-0700	Nigeria, Voice of	7255af	15120va			0630-0700 as	USA, Voice of America	5970af	6035af	6080af	7195af
0600-0700 vl	Papua New Guinea, NBC	9675do						9630af	11995af	12080af	
0600-0641	Romania, R Romania Intl	11725na	11940na			0630-0645	Vatican City, Vatican R	11625va	13765af	15570af	
0600-0700	Russia, Voice of Russia WS	17625au	21790au			0641-0700	Romania, R Romania Intl	9625eu	11725na	11775eu	11840eu
0600-0700 vl	S Africa, Channel Africa	15215af						11885eu	11940na	15270eu	
0600-0700	Sierra Leone, SLBS	3316do				0645-0700	Germany, Deutsche Welle	6140eu			
0600-0700	Singapore, RCorp Singapore	6150do				0645-0700	Vatican City, Vatican R	11625va	13795af	15570af	

## SELECTED PROGRAMS

## Sundays

0600	UK, BBC London (af/as): World News. See S 0000.	0600	USA, WEWN Birmingham AL: The Best of Life on the Rock. See S 1500.	0630	UK, BBC London (af): Network Africa. See M 0330.
0600	UK, BBC London (am/eu): The World Today. See S 0000.	0600	UK, BBC London (am/eu): Variable Feature (Am). See S 0530.	0630	UK, BBC London (as): My Century. See M 0030.
0605	UK, BBC London (as): Variable Feature. See S 0530.	0600	UK, BBC London (as): Discovery. See T 0005.		
0615	UK, BBC London (af): Sports Roundup. See S 0320.				
0630	UK, BBC London (af): Postmark Africa. See S 0330.				
0630	UK, BBC London (am/eu): In Praise of God. See S 0230.				
0630	UK, BBC London (as): Variable Feature. See S 0530.				

## Mondays

0600	UK, BBC London (af/as): World News. See S 0000.	0600	UK, BBC London (af/as): World News. See S 0000.	0600	UK, BBC London (af/as): World News. See S 0000.
0600	UK, BBC London (am/eu): The World Today. See S 0000.	0600	UK, BBC London (am/eu): The World Today. See S 0000.	0600	UK, BBC London (as): World News. See S 0000.
0600	USA, WEWN Birmingham AL: The Best of Life on the Rock. See S 1500.	0600	UK, BBC London (am/eu): The World Today. See S 0000.	0600	UK, BBC London (as): World News. See S 0000.
0615	UK, BBC London (af): Sports Roundup. See S 0320.	0600	USA, WEWN Birmingham AL: The Best of Life on the Rock. See S 1500.	0600	UK, BBC London (as): World News. See S 0000.
0615	UK, BBC London (as): My Century. See M 0030.	0615	UK, BBC London (as): My Century. See M 0030.	0600	UK, BBC London (as): World News. See S 0000.
0630	UK, BBC London (af): Network Africa. See M 0330.	0620	UK, BBC London (af): Sports Roundup. See S 0320.	0600	UK, BBC London (as): World News. See S 0000.
0630	UK, BBC London (am/eu): Everywoman (Am). See S 1130.	0620	UK, BBC London (as): Off the Shelf. See M 0145.	0600	UK, BBC London (as): World News. See S 0000.
0630	UK, BBC London (as): Health Matters. See M 0005.	0630	UK, BBC London (af): Network Africa. See M 0330.	0600	UK, BBC London (as): World News. See S 0000.

## Tuesdays

0600	UK, BBC London (af/as): World News. See S 0000.	0600	UK, BBC London (af/as): World News. See S 0000.
0600	UK, BBC London (am/eu): The World Today. See S 0000.	0600	UK, BBC London (as): Off the Shelf. See M 0145.

0600	USA, WEWN Birmingham AL: The Best of Life on the Rock. See S 1500.	0630	UK, BBC London (af): Network Africa. See M 0330.
0615	UK, BBC London (af): Sports Roundup. See S 0320.	0630	UK, BBC London (am/eu): Variable Feature (Am). See S 0530.
0630	UK, BBC London (af): Network Africa. See M 0330.	0630	UK, BBC London (as): My Century. See M 0030.
0630	UK, BBC London (am/eu): Variable Feature (Am). See S 0530.	0635	UK, BBC London (as): Discovery. See T 0005.

## Wednesdays

0600	UK, BBC London (af/as): World News. See S 0000.	0600	UK, BBC London (af/as): World News. See S 0000.
0600	UK, BBC London (am/eu): The World Today. See S 0000.	0600	UK, BBC London (am/eu): The World Today. See S 0000.
0600	USA, WEWN Birmingham AL: The Best of Life on the Rock. See S 1500.	0600	UK, BBC London (as): World News. See S 0000.
0615	UK, BBC London (as): My Century. See M 0030.	0600	UK, BBC London (as): World News. See S 0000.
0620	UK, BBC London (af): Sports Roundup. See S 0320.	0600	USA, WEWN Birmingham AL: The Best of Life on the Rock. See S 1500.
0620	UK, BBC London (as): Off the Shelf. See M 0145.	0615	UK, BBC London (as): My Century. See M 0030.
0630	UK, BBC London (af): Network Africa. See M 0330.	0620	UK, BBC London (af): Sports Roundup. See S 0320.
0635	UK, BBC London (as): One Planet. See W 0005.	0620	UK, BBC London (as): Off the Shelf. See M 0145.

## Thursdays

0600	UK, BBC London (af/as): World News. See S 0000.	0600	UK, BBC London (af/as): World News. See S 0000.
0600	UK, BBC London (as): World News. See S 0000.	0600	UK, BBC London (as): Off the Shelf. See M 0145.
0600	USA, WEWN Birmingham AL: The Best of Life on the Rock. See S 1500.	0600	UK, BBC London (as): World News. See S 0000.
0615	UK, BBC London (as): My Century. See M 0030.	0600	UK, BBC London (as): World News. See S 0000.
0620	UK, BBC London (af): Sports Roundup. See S 0320.	0600	USA, WEWN Birmingham AL: The Best of Life on the Rock. See S 1500.
0620	UK, BBC London (as): Off the Shelf. See M 0145.	0615	UK, BBC London (as): My Century. See M 0030.

0630	UK, BBC London (af): Network Africa. See M 0330.
0635	UK, BBC London (as): The Works. See H 0005.

## Fridays

0600	UK, BBC London (af/as): World News. See S 0000.	0600	UK, BBC London (af/as): World News. See S 0000.
0600	UK, BBC London (am/eu): The World Today. See S 0000.	0600	UK, BBC London (am/eu): The World Today. See S 0000.
0600	USA, WEWN Birmingham AL: The Best of Life on the Rock. See S 1500.	0600	UK, BBC London (am/eu): The World Today. See S 0000.
0615	UK, BBC London (am/eu): Short Story. See S 1515.	0600	UK, BBC London (as): My Century. See M 0030.
0620	UK, BBC London (af): Sports Roundup. See S 0320.	0635	UK, BBC London (as): Science in Action. See F 0005.
0630	UK, BBC London (af): Network Africa. See M 0330.	0655	UK, BBC London (am/eu): Science Extra. See S 0030.
0630	UK, BBC London (as): My Century. See M 0030.		
0635	UK, BBC London (as): Science in Action. See F 0005.		
0655	UK, BBC London (am/eu): Science Extra. See S 0030.		

## Saturdays

0600	UK, BBC London (af/as): World News. See S 0000.	0600	UK, BBC London (af/as): World News. See S 0000.
0600	UK, BBC London (am/eu): World News. See S 0000.	0600	UK, BBC London (am/eu): World News. See S 0000.
0600	USA, WEWN Birmingham AL: The Best of Life on the Rock. See S 1500.	0600	UK, BBC London (as): My Century. See M 0030.
0615	UK, BBC London (am/eu): People and Politics. See A 0030.	0600	UK, BBC London (as): World News. See S 0000.
0620	UK, BBC London (af): Sports Roundup. See S 0320.	0600	UK, BBC London (as): World News. See S 0000.
0630	UK, BBC London (af): This Week and Africa. See A 0430.	0600	UK, BBC London (as): World News. See S 0000.
0630	UK, BBC London (as): My Century. See M 0030.	0600	UK, BBC London (as): World News. See S 0000.

## FREQUENCIES

0700-0800	Anguilla,Caribbean Beacon	6090am				0800-0900	Albania, Trans World R	9870eu	12070eu		
0700-0800 vl	Australia, ABC/Katherine	5025do				0800-0900	Anguilla,Caribbean Beacon	6090am			
0700-0800 vl	Australia, ABC/Tent Creek	4910do				0800-0830 vl	Australia, ABC/Katherine	5025do			
0700-0800	Australia, Radio	9660pa	12080va	15240pa	15415as	0800-0830 vl	Australia, ABC/Tent Creek	4910do			
		15515va	17580va	17750as	21725pa	0800-0900	Australia, Radio	5995pa	9710pa	11650va	12080va
0700-0800 vl	Botswana, Radio	4820do						13605va	15515va	17580va	21725pa
0700-0800	Canada, CFRX Toronto	6070do				0800-0826	Belgium,R Vlaanderen Intl	5985am			
0700-0800	Canada, CFVP Calgary	6030do				0800-0900 vl	Botswana, Radio	4820do	4830do	7255do	
0700-0800	Canada, CHNX Halifax	6130do				0800-0900 vl	Canada, CBC N Quebec Svc	9625do			
0700-0800	Canada, CKZN St John's	6160do				0800-0900	Canada, CFRX Toronto	6070do			
0700-0800	Canada, CKZU Vancouver	6160do				0800-0900	Canada, CFVP Calgary	6030do			
0700-0800	Costa Rica,RF Peace Intl	6975va	15050va			0800-0900	Canada, CHNX Halifax	6130do			
0700-0705	Croatia, Croatian Radio	11880au	13820al			0800-0900	Canada, CKZN St John's	6160do			
0700-0800	Ecuador, HCJB	9800eu	11755pa	21455va		0800-0900	Canada, CKZU Vancouver	6160do			
0700-0800	Eqt Guinea, Radio Africa	15186af				0800-0900	Costa Rica,RF Peace Intl	15050va			
0700-0800	Germany, Deutsche Welle	6140eu				0800-0900 as	Costa Rica,RF Peace Intl	6975va			
0700-0800	Germany, Voice of Hope	5975eu				0800-0805	Croatia, Croatian Radio	13820au			
0700-0715	Ghana, Ghana BC Corp	3366do	4915do			0800-0827	Czech Rep, R Prague Intl	11600eu	15255eu		
0700-0800	Guyana, GBC/Voice of	5950do				0800-0900	Ecuador, HCJB	9800eu	11755pa	21455va	
0700-0800	Italy, IRRS	7120va				0800-0900	Eqt Guinea, Radio Africa	15186af			
0700-0800	Kenya, Kenya BC Corp	4885do	4935do			0800-0900	Germany, Deutsche Welle	6140eu			
0700-0800	Kiribati, Radio	9810do				0800-0900	Germany, Voice of Hope	5975eu			
0700-0800	Kuwait, Radio	15110va				0800-0805	Ghana, Ghana BC Corp	4915do			
0700-0800 vl	Lesotho, Radio	4800do				0800-0900	Guam, TWR/KTWR	15200as	15330as		
0700-0715	Liberia,LCN/R Liberia Int	5100do				0800-0900	Guyana, GBC/Voice of	5950do			
0700-0800	Malaysia, Radio	7295do				0800-0900	Indonesia, Voice of	9525va			
0700-0800	Malaysia, RTM Sarawak	7160do				0800-0900	Italy, IRRS	7120va			
0700-0800	Malaysia, Voice of	6175as	9750as	15295as		0800-0900	Kenya, Kenya BC Corp	4885do	4935do		
0700-0705	New Zealand, R NZ Intl	17675va				0800-0900	Kiribati, Radio	9810do			
0700-0800 vl	Nigeria, Radio/Ibadan	6050do				0800-0900 vl	Lesotho, Radio	4800do			
0700-0800 vl	Nigeria, Radio/Kaduna	4770do				0800-0900	Liberia,LCN/R Liberia Int	5100do			
0700-0800 vl	Nigeria, Voice of	7255saf	15120va			0800-0900	Malaysia, Radio	7295do			
0700-0800	Palau, KHBN/Voice of Hope	9965as	9985as	15725as		0800-0825	Malaysia, Voice of	6175as	9750as	15295as	
0700-0730 vl	Papua New Guinea, NBC	9675do				0800-0900 vl	Malaysia,RTM KotaKinabalu	5980do			
0700-0756	Romania, R Romania Intl	15340af	17745af			0800-0900 mtwhf	Monaco, Trans World Radio	9870eu			
0700-0800	Russia,Voice of Russia WS	15490au	17625au	17655as	21790au	0800-0830	Myanmar, Radio	9730do			
0700-0800	Sierra Leone, SLBS	3316do				0800-0900	N Marianas, KFBS Saipan	11650as	15380as		
0700-0800	Singapore,RCorp Singapore	6150do				0800-0900	New Zealand, R NZ Intl	9700va			
0700-0730	Slovakia, R Slovakia Intl	11990au	15460au	21705au		0800-0900 vl	Nigeria, Radio/Ibadan	6050do			
0700-0800 vl	Solomon Islands, SIBC	5020do				0800-0900 vl	Nigeria, Radio/Kaduna	4770do			
0700-0730 mtwhf	Swaziland, Trans World R	4775saf	6100af	9500af		0800-0900	Nigeria, Radio/Lagos	3326do			
0700-0720 a	Swaziland, Trans World R	4775saf	6100af	9500af		0800-0900	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as
0700-0705 s	Swaziland, Trans World R	4775saf	6100af	9500af		0800-0900 vl	Papua New Guinea, NBC	4890do			
0700-0800	Taiwan, Radio Taipei Intl	5950na				0800-0900	Russia,Voice of Russia WS	17495au	17625au	17665au	21790au
0700-0800	UK, BBC World Service	3955eu	6175va	6190af	6195eu	0800-0900	S Africa, Channel Africa	9750af	21530af		
		9410eu	9580pa	9740as	11765af	0800-0900	Sierra Leone, SLBS	5980do			
		11940af	11955pa	12095va	15240af	0800-0900	Singapore,RCorp Singapore	6150do			
		15310as	15485af	15565eu	17640eu	0800-0900	South Korea, R Korea Intl	9570au	13670eu		
		17760as	17790as	17830af	21660as	0800-0900	UK, BBC World Service	3955eu	6190af	6195eu	9410eu
		6005af						9740as	11940af	11955pa	12095eu
0700-0730	UK, BBC World Service	6005af						15220sa	15310as	15360as	15400af
0700-0800 as	UK, BBC World Service	15575me	17885af					15485af	15565eu	15575me	17640eu
0700-0800	USA, KAIJ Dallas TX	5810na						17790as	17830af	21830as	
0700-0800	USA, KTBN Salt Lk City UT	7510na				0800-0830	UK, BBC World Service	17790sa			
0700-0800	USA, KWHR Naalehu HI	11565as	17780as			0800-0900 as	UK, BBC World Service	17885af			
0700-0800	USA, WBCQ Monticello ME	7415na				0800-0900	USA, KAIJ Dallas TX	5810na			
0700-0800	USA, WEWN Birmingham AL	5825va				0800-0900	USA, KNLS Anchor Point AK	9615as			
0700-0800	USA, WHRA Greenbush ME	7435af				0800-0900	USA, KTBN Salt Lk City UT	7510na			
0700-0800	USA, WHRI Noblesville IN	5745na				0800-0900	USA, KWHR Naalehu HI	11565as	17780as		
0700-0800	USA, WJCR Upton KY	7490na				0800-0900	USA, Voice of America	11775as	13610as	15150as	
0700-0800	USA, WRNO New Orleans LA	7395na				0800-0900	USA, WBCQ Monticello ME	7415na			
0700-0800	USA, WSHB Cypress Crk SC	7535af				0800-0900	USA, WEWN Birmingham AL	5825va			
0700-0800	USA, WTJC Newport NC	9370am				0800-0900	USA, WHRA Greenbush ME	7435af			
0700-0800	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na	0800-0900	USA, WHRI Noblesville IN	5745na	7315sa		
0700-0745	USA, WYFR Okeechobee FL	5850eu	7355eu	9985eu		0800-0900	USA, WJCR Upton KY	7490na			
0700-0800	USA, WYFR Okeechobee FL	9985va				0800-0900	USA, WRNO New Orleans LA	7395na			
0700-0800 vl	Vanuatu, Radio	4960do				0800-0900	USA, WSHB Cypress Crk SC	7535eu	9845pa		
0700-0800	Zambia, Christian Voice	9865do				0800-0900	USA, WTJC Newport NC	9370am			
0700-0800	Zambia, Natl BC Corp	6165do	6265do			0800-0900	USA, WWCR Nashville TN	2390na	3210na	5070na	5935na
0700-0800 vl	Zimbabwe, Zimbabwe BC	4828do	5012do			0800-0900	USA, WJCR Upton KY	7490na			
0706-0800	New Zealand, R NZ Intl	9700va				0800-0900 vl	Vanuatu, Radio	4960do			
0710-0715 s	Kyrgyzstan, Kyrgyz Radio	4010do	4050do			0800-0900	Zambia, Christian Voice	9865do			
0725-0800	Myanmar, Radio	9730do				0800-0900	Zambia, Natl BC Corp	6165do	6265do		
0730-0800 t h	Georgia, Georgian Radio	6080me				0800-0900 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
0730-0800	Guam, TWR/KTWR	15200as				0804-0820	Pakistan, Radio	15530au	17835eu		
0730-0800 vl	Papua New Guinea, NBC	4890do				0815-0900 as	Italy, IRRS	7120va			
0730-0735 mtwhf	Swaziland, Trans World R	4775saf				0815-0900 f	Seychelles, FEBA Radio	15460as			
0730-0800	Switzerland, Swiss R Intl	9885va	13635af	17665af		0830-0900 vl	Australia, ABC/Alice Spgs	2310do			
0730-0745 mtwhfa	Vatican City, Vatican R	4005eu	5883eu	7250eu	9645eu	0830-0900 vl	Australia, ABC/Katherine	2485do			
		11740eu	15595eu			0830-0900 vl	Australia, ABC/Tent Creek	2325do			
0745-0800 as	Albania, Trans World R	9870eu				0830-0900	Australia, Radio	17750as			
0745-0755 as	Monaco, Trans World Radio	9870eu				0830-0900 a	Austria, R Austria Intl	21650as	21765as		
0750-0800	Greece, Voice of	9775au				0830-0900	Georgia, Georgian Radio	11910eu			
0755-0800 mtwhf	ALbania, Trans World R	9870eu	12070eu			0830-0900 vl	Solomon Islands, SIBC	5020do			
0755-0800 mtwhf	Monaco, Trans World Radio	9870eu				0830-0900	Switzerland, Swiss R Intl	9885au	13685au		
						0845-0900 mtwhf	USA, WRMI/R Miami Intl	9955am			





## FREQUENCIES

0900-0920	Albania, Trans World R	9870eu	12070eu			1000-1100	Anguilla,Caribbean Beacon	11775am				
0900-1000	Anguilla,Caribbean Beacon	6090am				1000-1030	Armenia, Voice of	4810eu	15270eu			
0900-1000 vl	Australia, ABC/Alice Spgs	2310do				1000-1100 vl	Australia, ABC/Alice Spgs	2310do				
0900-1000 vl	Australia, ABC/Katherine	2485do				1000-1100 vl	Australia, ABC/Katherine	2485do				
0900-1000 vl	Australia, ABC/Tent Creek	2325do				1000-1100 vl	Australia, ABC/Tent Creek	2325do				
0900-1000	Australia, Radio	11650va	11880as	13605as	17750as	1000-1100	Australia, Radio	11650va	11880as	17750as	21820as	
		21820as				1000-1100 vl	Botswana, Radio	4820do	4830do	7255do		
0900-0910 s	Bhutan, Bhutan BC Service	6030do				1000-1100 vl	Canada, CBC N Quebec Svc	9625do				
0900-1000 vl	Botswana, Radio	4820do	4830do	7255do		1000-1100	Canada, CFRX Toronto	6070do				
0900-1000	Canada, CFRX Toronto	6070do				1000-1100	Canada, CFVP Calgary	6030do				
0900-1000	Canada, CFVP Calgary	6030do				1000-1100	Canada, CHNX Halifax	6130do				
0900-1000	Canada, CHNX Halifax	6130do				1000-1100	Canada, CKZN St John's	6160do				
0900-1000	Canada, CKZN St John's	6160do				1000-1100	Canada, CKZU Vancouver	6160do				
0900-1000	Canada, CKZU Vancouver	6160do				1000-1056	China, China Radio Intl	11730pa	15210pa			
0900-0956	China, China Radio Intl	11730pa	15210pa			1000-1100 mtwhf	Costa Rica,RF Peace Intl	15050va				
0900-1000 mtwhf	Costa Rica,RF Peace Intl	15050va				1000-1100 as	Costa Rica,RF Peace Intl	6975va				
0900-1000 as	Costa Rica,RF Peace Intl	6975va				1000-1029	Czech Rep, R Prague Intl	17485af	21745va			
0900-0905	Croatia, Croatian Radio	13820au				1000-1100	Ecuador, HCJB	11755pa	21455va			
0900-1000	Ecuador, HCJB	11775pa	21455va			1000-1100	Eqt Guinea, Radio Africa	15186af				
0900-1000	Eqt Guinea, Radio Africa	15186af				1000-1100	Germany, Voice of Hope	5975eu				
0900-0945	Germany, Deutsche Welle	6140eu	6160pa	11785af	15105as	1000-1100	Guam, AWR/KSDA	11560as				
		15410af	15470as	17800af	17820as	1000-1100	Guam, TWR/KTWR	9865as				
		7860af	21600af			1000-1100	Guyana, GBC/Voice of	5950do				
		5995eu	13800eu			1000-1100	India, All India Radio	11585as	11737au	13700as	15020as	
0900-1000 a	Germany, Good News World	5975eu						17385au	17840as			
0900-1000	Germany, Voice of Hope	4915do	6130do			1000-1100 as/vl	Italy, IRRS	7120va				
0900-0915	Ghana, Ghana BC Corp	15200as	15330as			1000-1100	Japan, Radio/NHK	9695as	11850pa	15590as		
0900-0915	Guam, TWR/KTWR	5950do				1000-1100	Kenya, Kenya BC Corp	4935do				
0900-1000	Guyana, GBC/Voice of	7120va				1000-1100 vl	Lesotho, Radio	4800do				
0900-1000 as/vl	Italy, IRRS	4935do				1000-1100	Malaysia, Radio	7295do				
0900-1000	Kenya, Kenya BC Corp	9810do				1000-1100 vl	Malaysia,RTM KotaKinabalu	5980do				
0900-0930	Kiribati, Radio	4800do				1000-1100	N Marianas, KFBS Saipan	9495as	11650as	15380as		
0900-1000 vl	Lesotho, Radio	5100do				1000-1100	N Marianas, KHBI Saipan	11840as				
0900-0915	Liberia,LCN/R Liberia Int	7295do				1000-1100	New Zealand, R NZ Intl	9700va				
0900-1000	Malaysia, Radio	5980do				1000-1100 vl	Nigeria, Radio/Ibadan	6050do				
0900-1000 vl	Malaysia,RTM KotaKinabalu	11770eu				1000-1100 vl	Nigeria, Radio/Kaduna	4770do				
0900-1000 s	Malta, VO Mediterranean	9870eu				1000-1100 vl	Nigeria, Voice of	7255af	15120va			
0900-0920 mtwhf	Monaco, Trans World Radio	9495as	11650as	15380as		1000-1100	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as	
0900-1000	N Marianas, KFBS Saipan	11725as				1000-1100 vl	Papua New Guinea, NBC	4890do				
0900-1000	N Marianas, KHBI Saipan	9700va				1000-1100	Papua New Guinea, NBC	11635as				
0900-1000 vl	New Zealand, R NZ Intl	6050do				1000-1100	Philippines, FEBC R Intl	5980do				
0900-1000 vl	Nigeria, Radio/Ibadan	4770do				1000-1030	Sierra Leone, SLBS	11740as				
0900-1000 vl	Nigeria, Radio/Kaduna	3326do				1000-1100	Singapore, RTE Radio	6150do				
0900-1000	Nigeria, Radio/Lagos	9955as	9965as	9985as	15725as	1000-1100 vl	Singapore,RCorp Singapore	5020do				
0900-1000	Palau, KHBN/Voice of Hope	4890do				1000-1030	Solomon Islands, SIBC	5050af				
0900-1000 vl	Palau, KHBN/Voice of Hope	15490au	17495au	17625au	21790au	1000-1100	Tanzania, Radio	6190af	6195va	9410va	9740as	
0900-1000	Papua New Guinea, NBC	5980do						11765pa	11940af	12095eu	15220sa	
0900-1000	Russia,Voice of Russia WS	5980do						15310as	15485af	15565eu	17640va	
0900-1000	Sierra Leone, SLBS	6150do						17760va	17790as	17885af	21470af	
0900-1000	Singapore,RCorp Singapore	5020do				1000-1030	UK, BBC World Service	15360as	21660as			
0900-1000 vl	Solomon Islands, SIBC	5050af				1000-1100	USA, KAIJ Dallas TX	5810na				
0900-1000	Tanzania, Radio	6190af	6195va	6195as	9410eu	1000-1100	USA, KAIJ Dallas TX	5810na				
0900-1000	UK, BBC World Service	9740as	9740as	11765as	11940af	1000-1100	USA, KTBN Salt Lk City UT	7510na				
		11945as	11955as	11965pa	12095af	1000-1100	USA, KTBN Salt Lk City UT	7510na				
		15310as	15400af	15485af	15565eu	1000-1100	USA, KWHR Naalehu HI	9930as	11565as			
		15575me	17640eu	17790as	17830af	1000-1100	USA, KWHR Naalehu HI	9930as	11565as			
		21660as					USA, Voice of America	6165ca	7405ca	9590ca	9770pa	
		15190sa						11660as	11720as	15240as	15425as	
0900-1000 as	UK, BBC World Service	7415na				1000-1100	USA, WBCQ Monticello ME	7415na				
0900-1000	USA, KAIJ Dallas TX	7425na				1000-1100	USA, WBCQ Monticello ME	7425na	15745eu			
0900-1000	USA, KTBN Salt Lk City UT	6040na				1000-1100	USA, WEWN Birmingham AL	6040na	9495am			
0900-1000	USA, KWHR Naalehu HI	7490na				1000-1100	USA, WHRI Noblesville IN	7490na				
0900-1000	USA, Voice of America	9955am				1000-1100	USA, WJCR Upton KY	7490na				
0900-1000	USA, WBCQ Monticello ME	7395na				1000-1100 mtwhf	USA, WRMI/R Miami Intl	9955am				
0900-1000	USA, WEWN Birmingham AL	6095am				1000-1100	USA, WRNO New Orleans LA	9955am				
0900-1000	USA, WHRA Greenbush ME	9370am				1000-1100	USA, WRNO New Orleans LA	9370am				
0900-1000	USA, WHRI Noblesville IN	11900na				1000-1100	USA, WSHB Cypress Crk SC	11900na				
0900-1000	USA, WJCR Upton KY	2390na				1000-1100 as	USA, WSHB Cypress Crk SC	2390na				
0900-1000 mtwhf	USA, WRMI/R Miami Intl	5950na				1000-1100	USA, WWCN Nashville TN	5950na	3210na	5070na	5935na	
0900-1000	USA, WRNO New Orleans LA	9840va				1000-1100	USA, WYFR Okeechobee FL	9840va	12020as			
0900-1000	USA, WSHB Cypress Crk SC	9865do				1000-1027	Vietnam, Voice of	9840va	12020as			
0900-1000	USA, WTJC Newport NC	6165do				1000-1100	Zambia, Christian Voice	9865do				
0900-1000	USA, WWCN Nashville TN	4828do				1000-1100	Zambia, Natl BC Corp	6165do	6265do			
0900-1000	Zambia, Christian Voice	15330as				1000-1100 vl	Zimbabwe, Zimbabwe BC	4828do	5012do			
0900-1000 vl	Zambia, Natl BC Corp	6165do	6265do			1006-1058	Australia, Def Forces R	11140as				
0900-1000 vl	Zimbabwe, Zimbabwe BC	4828do	5012do			1030-1100	Ethiopia, Radio	5990do	7110do	9705do		
0915-0930	Guam, TWR/KTWR	15330as				1030-1100	Lithuania, Radio Vilnius	9555eu	9710eu			
0920-0950 s	Albania, Trans World R	9870eu	12070eu			1030-1100	Malaysia, RTM Sarawak	7160do				
0920-0930 t	Kyrgyzstan, Kyrgyz Radio	4010do	4050do			1030-1100	Netherlands, Radio	7260as	9820as	12065as		
0920-0950 s	Monaco, Trans World Radio	9870eu				1030-1100	South Korea, R Korea Intl	11715na				
0930-1000	Austria, R Austria Intl	21650as	21765au			1030-1100 as	Tanzania, Radio	5050af				
0930-1000	Georgia, Georgian Radio	11910me				1030-1100	UAE, Radio Dubai	13675eu	15370eu	15395eu	21605eu	
0930-1000	Guam, TWR/KTWR	9865as	15330as									
0930-1000	Italy, AWR Europe	7230eu										
0930-1000	Netherlands, Radio	7260as	9820au	12065as								
0930-1000	Philippines, FEBC R Intl	11635as										
0945-1000	Germany, Deutsche Welle	6140eu										
0953-1000	Australia, Def Forces R	11140as										



1100-1200	Anguilla, Caribbean Beacon	11775am				1100-1200	Singapore, R Singapore Int	6015as	6150as		
1100-1200 vl	Australia, ABC/Alice Spgs	2310do				1100-1130 vl	Solomon Islands, SIBC	5020do			
1100-1200 vl	Australia, ABC/Katherine	2485do				1100-1130	Switzerland, Swiss R Intl	9535eu			
1100-1200 vl	Australia, ABC/Tent Creek	2325do				1100-1200	Switzerland, Swiss R Intl	9540as	21770as		
1100-1200	Australia, Radio	5995pa 21820as	6020pa	9580va	11650va	1100-1200	Taiwan, Voice of Asia	7445as			
						1100-1200 as	Tanzania, Radio	5050af			
1100-1200 vl	Botswana, Radio	4820do	4830do	7255do		1100-1200	UK, BBC World Service	5965am	6190af	6195va	9580as
1100-1200	Canada, CFRX Toronto	6070do						9740as	11705as	11765as	11940af
1100-1200	Canada, CFVP Calgary	6030do						12095eu	15220va	15280as	15310as
1100-1200	Canada, CHNX Halifax	6130do						15575me	17640eu	17830af	17885af
1100-1200	Canada, CKZN St John's	6160do				1100-1130 as	UK, BBC World Service	6195am	15400af	17790sa	
1100-1200	Canada, CKZU Vancouver	6160do				1100-1200	USA, KAIJ Dallas TX	5810na			
1100-1200 mtwhf	Costa Rica, RF Peace Intl	15050va				1100-1200	USA, KTBN Salt Lk City UT	7510na			
1100-1200 as	Costa Rica, RF Peace Intl	6975va				1100-1200	USA, KWHR Naalehu HI	9930as	11565as		
1100-1200	Ecuador, HCJB	12005am	15115am	21455va		1100-1200	USA, Voice of America	6160as	9355as	9645as	9760as
1100-1200	Eq't Guinea, Radio Africa	15186af						9770as	11720as	15160as	15240as
1100-1145	Germany, Deutsche Welle	6140eu 21780af	15370af	15410af	17800af	1100-1130 mtwhf	USA, Voice of America	13675af	15510af	17690af	17780af
								21705af			
1100-1200 as	Ghana, Ghana BC Corp	4915do	6130do			1100-1200	USA, WEWN Birmingham AL	7425na	15745eu		
1100-1200	Guyana, GBC/Voice of	5950do				1100-1200	USA, WHRI Noblesville IN	6040na	9495am		
1100-1200	Iran, VOIRI	15430me	17560as	21510as		1100-1200	USA, WJCR Upton KY	7490na			
1100-1200 as/vl	Italy, IRRS	7120va				1100-1200	USA, WRNO New Orleans LA	7395na			
1100-1200	Japan, Radio/NHK	6120na	9695as	15590as		1100-1200	USA, WSHB Cypress Crk SC	6095am	11660sa		
1100-1200	Jordan, Radio	11690eu				1100-1200 as	USA, WWBS Macon GA	11900na			
1100-1200	Kenya, Kenya BC Corp	4935do				1100-1200	USA, WWCR Nashville TN	2390na	5070na	5935na	12160na
1100-1110 fa	Kyrgyzstan, Kyrgyz Radio	4010do	4050do			1100-1200	USA, WYFR Okeechobee FL	5950na	7355na	11830na	
1100-1200 vl	Lesotho, Radio	4800do				1100-1130	Vietnam, Voice of	7285as			
1100-1110	Liberia, LCN/R Liberia Int	5100do				1100-1200	Zambia, Christian Voice	9865do			
1100-1200	Malaysia, Radio	7295do				1100-1200	Zambia, Natl BC Corp	6165do	6265do		
1100-1200 vl	Malaysia, RTM KotaKinabalu	5980do				1100-1200 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1100-1200	N Marianas, KFBS Saipan	9495as	11650as	15380as		1105-1200 occsnal	New Zealand, R NZ Intl	6100va			
1100-1105	New Zealand, R NZ Intl	9700va				1115-1145	Nepal, Radio	3230as	5005as		
1100-1200 vl	Nigeria, Radio/Ibadan	6050do				1115-1130 mtwhfa	Vatican City, Vatican R	5883eu	9645eu	11740eu	15595eu
1100-1200 vl	Nigeria, Radio/Kaduna	4770do						21850va			
1100-1200 vl	Nigeria, Voice of	7255af	15120va			1130-1200	China, China Radio Intl	8660as	11700as		
1100-1200	North Korea, R Pyongyang	3560as 11335am	9640af 13650am	9850am	9975am	1130-1157	Czech Rep, R Prague Intl	11640eu	21745af		
						1130-1135	Israel, Kol Israel	15640va	17535va		
1100-1120	Pakistan, Radio	11835do	15530do			1130-1200 vl	Libya, Voice of Africa	15235va	15415va	15435va	
1100-1200	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as	1130-1200	Netherlands, Radio	6045eu	9855eu		
1100-1200 vl	Papua New Guinea, NBC	4890do				1130-1200 f	Vatican City, Vatican R	15595au	17550au		
1100-1200	Sierra Leone, SLBS	5980do				1145-1200	Germany, Deutsche Welle	6140eu			

## Daily

1100 UK, BBC London (af/am/as/eu): Newsdesk. World news and dispatches from overseas and UK correspondents.

1130 Netherlands. Radio: News. See S 0030.

## Monday-Friday

1100 USA, WEWN Birmingham AL: Living His Life  
Abundantly. Johnnette Benkovic shares how living a  
spirit-filled life can help you find joy in life's trials.

1100 UK, BBC London (am/eu): World News (Carib). A  
five minute news summary for listeners in the  
Caribbean.

1105 UK, BBC London (am/eu): Caribbean Report  
(Carib). Weekday coverage of current affairs in the  
Caribbean region with emphasis on political and  
economic analysis.

1110 UK, BBC London (am/eu): Sports for the Caribbean.  
A round-up of the latest scores and sports news.

1113 USA, WEWN Birmingham AL: Franciscan University  
Connection. See M 0030.

1115 UK, BBC London (am/eu): Caribbean Magazine.  
General news and features from around the islands.

1138 Netherlands, Radio: Newsline. Correspondent  
reports, interviews, and commentaries on current  
events.

## Sundays

1130 UK, BBC London (am/eu): In Praise of God. See S 0230.

1130 UK, BBC London (af/as): Everywoman. Features and reports on the activities of women across the globe.

1130 UK, BBC London (as): Play of the Week (EAs). A different radio drama program each week (alternative programming for East Asia).

1130 USA, WEWN Birmingham AL: The Gift of the Church. Father Robert Guste discusses the great treasures of the Catholic faith.

1138 Netherlands, Radio: Sincerely Yours. Veronica Wilson becomes the primary host of this eighteen minutes of listener feedback via regular and electronic mail and RN's telephone answerline.

1154 Netherlands, Radio: Dutch Horizons. This is the replacement for "Sounds Interesting" and is hosted by a new voice in the English Service--Bertine Krol.

## Mondays

1100 UK, BBC London (as): Newsdesk. See Daily 1100.  
1130 UK, BBC London (af): Meridian Feature. See M 0130.  
1130 UK, BBC London (am/eu): Pick of the World. See S 1530.  
1130 UK, BBC London (as): Meridian Feature. See M 0130.  
1130 UK, BBC London (as): The Learning Zone (SAs). For people who want to learn more about subjects such as science, health, the world and work and literature while practicing English listening skills.  
1130 USA, WEWN Birmingham AL: Life is Worth Living. This 50-part series was recorded in the 1960's and features Archbishop Fulton J. Sheen's timeless talks.  
1153 Netherlands, Radio: Research File. Anne Blair Gould produces and presents this interesting program of science and technology that is now in its tenth year.

## Tuesdays

1130	UK, BBC London (AE): Christianity at the Crossroads (Nov 30th, 7th, 14th, 21st). See M 1430.
1130	UK, BBC London (AE): Composer of the Month. See M 1530.
1130	UK, BBC London (am/eu): Variable Feature. See S 0530.
1130	UK, BBC London (as): The Learning Zone (SAs). See M 1130.
1130	UK, BBC London (as): Variable Feature. See S 0530.
1153	Netherlands, Radio: Music 52-15. Martha Hawley hosts this program of rarely heard international music.

## Wednesdays

1115 UK, BBC London (am/eu): Caribbean Magazine (Carib).  
See Mon-Fri 1115.  
1130 UK, BBC London (af): Meridian Live. See W 0430.  
1130 UK, BBC London (am/eu): Sports Int'l. See W 0030.  
1130 UK, BBC London (as): Meridian Live. See W 0430.  
1130 UK, BBC London (as): The Learning Zone (SAs). See M  
1130.

1130 USA, WEWN Birmingham AL: Feminism and Feminity.  
Dr. Alice Von Hildebrand and her guests discuss how the  
philosophy of some feminists have denigrated women's  
feminine nature.

1153 Netherlands, Radio: The Weekly Documentary. An in-  
depth treatment of one subject or a short series.

## Thursdays

1130 UK, BBC London (af): Meridian Books. See H 0430.  
1130 UK, BBC London (am/eu): Assignment. See H 0030.  
1130 UK, BBC London (as): Meridian Books. See H 0430.  
1130 UK, BBC London (as): The Learning Zone (SAs). See M 1130.  
1130 USA, WEWN Birmingham AL: Catholic History in the U.S.. See M 0000.  
1153 Netherlands, Radio: Media Network. Jonathan Marks and Diana Janssen look at the world of broadcasting. Top-rated.

## Fridays

1130 UK, BBC London (af): Music Review. See S 0130.  
1130 UK, BBC London (am/eu): Focus on Faith. See F 0030.  
1130 UK, BBC London (as): Music Review. See S 0130.  
1130 UK, BBC London (as): The Learning Zone (SAs). See M 1130.  
1130 USA, WEWN Birmingham AL: 2000 - The Great Jubilee. See S 1630.  
1153 Netherlands, Radio: Roughly Speaking. Max Ohlenschlager and Reza Kartosen cohost an upbeat magazine program for European youth.

## Saturdays

1100 USA, WEWN Birmingham AL: Our Father's Plan. See W 0200.  
1130 UK, BBC London (af): African Perspective. See T 1615.  
1130 UK, BBC London (am/eu): People and Politics. See A 0030.  
1130 UK, BBC London (as): My Century. See M 0030.  
1138 Netherlands, Radio: Europe Unzipped. See S 0038.  
1154 Netherlands, Radio: The Sound Fountain. See S 0054.





1300-1400	Anguilla, Caribbean Beacon	11775am				1300-1400	Sierra Leone, SLBS	5980do			
1300-1400 vl	Australia, ABC/Alice Spgs	2310do				1300-1400	Singapore, R Singapore Int	6015as	6150as		
1300-1400 vl	Australia, ABC/Katherine	2485do				1300-1330	South Korea, R Korea Intl	9570as	9640om	13670as	
1300-1400 vl	Australia, ABC/Tent Creek	2325do				1300-1400	Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1300-1400	Australia, Radio	5995pa	6020pa	9580va	11650va	1300-1330	Switzerland, Swiss R Intl	9535eu			
		17750pa	21820as			1300-1400 as	Tanzania, Radio	5050af			
1300-1400 vl	Botswana, Radio	4820do	4830do	7255do		1300-1400	Uganda, Radio	4976do			
1300-1320	Brazil, R Nacional Bras	15445am				1300-1400	UK, BBC World Service	5965am	5990as	6190af	6195va
1300-1400 vl	Canada, CBC N Quebec Svc	9625do						9515am	9580as	9590am	9740va
1300-1400	Canada, CFRX Toronto	6070do						11705as	12095eu	15220va	15310va
1300-1400	Canada, CFVP Calgary	6030do						15565eu	17640eu	17830af	17885af
1300-1400	Canada, CHNX Halifax	6130do						21470af	21660af		
1300-1400	Canada, CKZN St John's	6160do				1300-1400 f	UK, Merlin Network One	9750eu	12035eu	15235eu	
1300-1400	Canada, CKZU Vancouver	6160do				1300-1400	USA, KAIJ Dallas TX	5810na			
1300-1330	Canada, Radio Canada Intl	9640na	13650na	17710na		1300-1400	USA, KJES Vado NM	11715na			
1300-1400	China, China Radio Intl	7405na	9570pa	11660va	11675pa	1300-1400	USA, KNLS Anchor Point AK	7365as			
		11900pa	11980as	15180as		1300-1400	USA, KTNB Salt Lk City UT	7510na			
1300-1400	Costa Rica, RF Peace Intl	15050va				1300-1400	USA, KWHR Naalehu HI	9930as	11565as		
1300-1400	Ecuador, HCJB	12005am	15115am	21455va		1300-1400	USA, Voice of America	6160as	9355as	9645as	9760as
1300-1330	Egypt, Radio Cairo	17595as						11715as	15160as	15425as	
1300-1400	Eqt Guinea, Radio Africa	15186af				1300-1400	USA, WEWN Birmingham AL	11875na	15745eu		
1300-1400	Finland, YLE/R Finland	15400na	17660na			1300-1400	USA, WGTG McCaysville GA	9400va	12170am		
1300-1400	France, Radio France Intl	9805eu	15155eu	15195eu		1300-1400	USA, WHRI Noblesville IN	6040na	15105am		
1300-1329	Germany, Deutsche Welle	6140eu				1300-1400	USA, WJCR Upton KY	7490na			
1300-1400 a	Germany, Good News World	15330as				1300-1400 s	USA, WRMI/R Miami Intl	9955am			
1300-1330 s	Germany, Universal Life	9955na				1300-1400	USA, WRNO New Orleans LA	7395na			
1300-1400	Ghana, Ghana BC Corp	4915do	6130do			1300-1400	USA, WSHB Cypress Crk SC	9430na	9455ca		
1300-1400	Guyana, GBC/Voice of	5950do				1300-1400	USA, WTJC Newport NC	9370am			
1300-1400	Jordan, Radio	11690eu				1300-1400	USA, WWCN Nashville TN	5070na	5935na	7435na	15685na
1300-1400	Kenya, Kenya BC Corp	4935do				1300-1400	USA, WYFR Okeechobee FL	11740na	11830na	13695na	
1300-1400	Lebanon, Voice of Hope	6280me	11530va			1300-1345	USA, WYFR Okeechobee FL	11970na			
1300-1400	Lebanon, Voice of Hope	6280me	11530va			1300-1400	Zambia, Christian Voice	9865do			
1300-1400 vl	Lesotho, Radio	4800do				1300-1400	Zambia, Natl BC Corp	6165do	6265do		
1300-1310	Liberia, LCN/R Liberia Int	5100do				1300-1400 vl	Zimbabwe, Zimbabwe BC	4828do	5012do		
1300-1400	Malaysia, Radio	7295do				1315-1325 mtwhfa	Bhutan, Bhutan BC Service	5030do			
1300-1400 vl	Malaysia, RTM KotaKinabalu	5980do				1315-1400	Germany, Voice of Hope	15715as			
1300-1400	N Marianas, KFBS Saipan	9670as	11650as			1330-1400	Austria, R Austria Intl	6155eu	13730am	21650am	21765am
1300-1400	N Marianas, KHBI Saipan	11550as				1330-1400	Canada, Radio Canada Intl	6150as	9535as	9640na	13650na
1300-1400 occsnal	New Zealand, R NZ Intl	6100va						17710na			
1300-1400 vl	Nigeria, Radio/Ibadan	6050do				1330-1400	Guam, AWR/KSDA	11705as			
1300-1400 vl	Nigeria, Radio/Kaduna	4770do				1330-1400	India, All India Radio	9545as	11620as	13710as	
1300-1400	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as	1330-1400	Sweden, Radio	9425va	17870va		
1300-1400 vl	Papua New Guinea, NBC	4890do				1330-1400	Turkey, Voice of	15295as	17815eu		
1300-1400	Philippines, FEBC R Intl	11995as				1330-1400	UAE, Radio Dubai	13630eu	13675eu	15395eu	
1300-1400	Poland, Polish R Warsaw	6095eu	7270eu	9525eu	11820eu	1330-1400	Uzbekistan, R Tashkent	7285as	9715as	15295as	17775as
1300-1356	Romania, R Romania Intl	9690eu	15390eu	15445eu	17720na	1330-1357	Vietnam, Voice of	9730eu	13740eu		
1300-1400	S Africa, Channel Africa	11720af	17780af	21530af		1345-1400	Vatican City, Vatican R	17515as	17550as	21620as	

## SELECTED PROGRAMS

1300	China, China Radio Intl: News. A ten-minute summary of world news.
1300	UK, BBC London (af/am/as/eu): Newshour. A comprehensive look at the major topics of the day, plus up-to-the-minute international and British news.
1310	China, China Radio Intl: News about China. Ten minutes of home news.

1300 USA, WEWN Birmingham AL: Daily Mass Live. From  
Our Lady of the Angels Monastery in Alabama.

1320 China, China Radio Intl: Current Affairs. An in-depth  
look at events and happenings in China.

1325 China, China Radio Intl: Press Clippings. Several  
items from the Chinese press.

1300 USA, WEWN Birmingham AL: Sunday Mass Live.  
See S 0000.

1313 China, China Radio Intl: Sports Beat. News from the  
world of sports.

1320 China, China Radio Intl: People in the Know.  
Interviews with personalities both home and abroad.

1325 China, China Radio Intl: Report on Developing  
Countries. A report on projects in the Third World.

1335 China, China Radio Intl: Song of the Week. A  
selection of the new non music in China.

1345 China, China Radio Intl: Voices from Other Lands. A cultural program about the world and its people.

1330 China, China Radio Intl: China's Open Windows. Focus  
on a particular area of investment in China.

1334 China, China Radio Intl: Changzhou Reports. A look at  
this industrial city in East China's Jiangsu Province and  
the people who live and work there.

1345 China, China Radio Intl: Idioms and Their Stories. A  
regular feature for students studying Chinese.

1339 China, China Radio Intl: Orient Arena. Focus on sporting events and Chinese sports personalities.

1345 China, China Radio Intl: Voices from Other Lands. See S 1345

1338 China, China Radio Intl: Profile. The activities of an  
interesting individual are examined.

1345 China, China Radio Intl: Learn to Speak Chinese.  
Chinese language lessons for English speakers.

1335 China, China Radio Intl: Across the Land. NEW! Life in China.

1340 China, China Radio Intl: Focus. Looking at an issue of  
significance to China's development.

1344 China, China Radio Intl: Cultural Spectrum. The rich  
cultural heritage of China in literature, music and art.

1335 China, China Radio Intl: Changzhou Reports. See M  
1334.  
1339 China, China Radio Intl: Life in China. Focus on an  
aspect of everyday living.  
1345 China, China Radio Intl: Global Review. News about  
developing nations.

1300 USA, WEWN Birmingham AL: Daily Mass Live. See M  
1300.  
1315 China, China Radio Intl: Asia-Pacific News. Five minutes  
of regional news.  
1320 China, China Radio Intl: Report on Developing  
Countries. See S 1325.  
1330 China, China Radio Intl: China Scrapbook. Snippets of  
facts about China's past and present.  
1335 China, China Radio Intl: Music from China. Chinese  
music from traditional to pop to annual music festivals.







1500-1600	Anguilla,Caribbean Beacon	11775am							Papua New Guinea, NBC	4890do			
1500-1600 vl	Australia, ABC/Alice Spgs	2310do							Russia,Voice of Russia WS	12005as	12025as	15550as	
1500-1600 vl	Australia, ABC/Katherine	2485do							S Africa, Channel Africa	17770af			
1500-1600 vl	Australia, ABC/Tent Creek	2325do							Seychelles, FEBA Radio	11640as			
1500-1600	Australia, Radio	5995as	6180va	9500as	9580va				Sierra Leone, SLBS	5980do			
		11650va	11660as	17750pa					Singapore,RCorp Singapore	6150do			
1500-1600 vl	Botswana, Radio	4820do	4830do	7255do					Sri Lanka, Sri Lanka BC	6005as	9730as	15425as	
1500-1600 vl	Canada, CBC N Quebec Svc	9625do							Tanzania, Radio	5050af			
1500-1600	Canada, CFRX Toronto	6070do							Uganda, Radio	4976do			
1500-1600	Canada, CFPV Calgary	6030do							UK, BBC World Service	5975as	5990as	6195as	9410va
1500-1600	Canada, CHNX Halifax	6130do								9515am	9590am	9740va	12095eu
1500-1600	Canada, CKZN St John's	6160do								15220am	15310as	15400af	15485af
1500-1600	Canada, CKZU Vancouver	6160do								17640eu	17830af	17840va	17885af
1500-1600	Canada, Radio Canada Intl	6185as							1500-1530	UK, BBC World Service	11860af	17630as	21490af
1500-1600 s	Canada, Radio Canada Intl	9640na	13655na	17710na					1500-1600 a	UK, Merlin Network One	9605eu	13640eu	15510eu
1500-1556	China, China Radio Intl	7160as	9785as	13685as	15125af				1500-1600	USA, KAJJ Dallas TX	13815na		
1500-1600	Costa Rica,RF Peace Intl	15050va							1500-1600	USA, KTVN Salt Lk City UT	7510na		
1500-1600	Ecuador, HCJB	12005am	15115am	21455va					1500-1600	USA, KWHR Naalehu HI	9930as		
1500-1600	Eqt Guinea, Radio Africa	15186af							1500-1600	USA, Voice of America	7125as	7215as	9645as
1500-1600	Finland, YLE/R Finland	15400na								15205va	15255va	15395as	9700me
1500-1600	Germany, Voice of Hope	15715as							1500-1600	USA, WEWN Birmingham AL	11875na	15745eu	
1500-1600	Guam, TWR/KTWR	15330as							1500-1600	USA, WGTG McCaysville GA	9400va	12170am	
1500-1600	Guyana, GBC/Voice of	5950do							1500-1600	USA, WHRI Noblesville IN	6040sa	15105na	
1500-1530	Israel, Kol Israel	15650va	17535va						1500-1600	USA, WJCR Upton KY	7490na		
1500-1600	Japan, Radio/NHK	7200as	9505na	9750as	11730as				1500-1600 irreg	USA, WMLK Bethel PA	9465am		
1500-1600	Jordan, Radio	11690eu							1500-1600 s	USA, WRMI/R Miami Intl	9955am		
1500-1600	Kenya, Kenya BC Corp	4935do							1500-1600	USA, WRNO New Orleans LA	7395na		
1500-1600	Lebanon, Voice of Hope	6280me	11530va						1500-1600	USA, WWCR Nashville TN	9475na	12160na	13845na
1500-1600 vl	Lesotho, Radio	4800do							1500-1600	USA, WYFR Okeechobee FL	11830na	17760na	15685na
1500-1510	Liberia,LCN/R Liberia Int	5100do							1500-1600 vl	Vatican City, Vatican R	17540as		
1500-1600	Malaysia, Radio	7295do							1500-1600	Zambia, Christian Voice	9865do		
1500-1600	Malaysia, RTM Sarawak	7160do							1500-1600	Zambia, Natl BC Corp	6165do	6265do	
1500-1600 vl	Malaysia,RTM KotaKinabalu	5980do							1500-1600 vl	Zimbabwe, Zimbabwe BC	4828do	5012do	
1500-1530	Mexico, Radio Mexico Intl	9705am							1515-1600	Seychelles, FEBA Radio	11695as		
1500-1600	N Marianas, KFBS Saipan	9465as	9495as	9670as					1530-1540	Bangladesh, Bangla Betar	4890as	15520as	
1500-1600 occsnal	New Zealand, R NZ Intl	6145va							1530-1600	Guam, AWR/KSDA	9355as	11920as	
1500-1600 vl	Nigeria, Radio/Ibadan	6050do							1530-1600	Iran, VOIRI	7250as	11680as	13605as
1500-1600 vl	Nigeria, Radio/Kaduna	4770do							1530-1600	Mongolia, Voice of	9720as	12085as	15150as
1500-1600 vl	Nigeria, Voice of	7255af	15120va						1530-1600	Netherlands, Radio	12070as	12090as	15590as
1500-1600	North Korea, R Pyongyang	3560eu	9640as	9975me	11335am				1530-1600	Tanzania, Radio	5050af		
		11735am	13650am						1545-1600 sh	Bangladesh, Bangla Betar	4880as	15520as	
1500-1600	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as				1550-1600 a	Vatican City, Vatican R	12065om	13765au	15500au

## SELECTED PROGRAMS

1500 UK, BBC London (af/am(T-A)/as/eu(T-A)): World News. See S 0000.

1530 Netherlands. Radio: News. See S 0030.

1505 UK, BBC London (af/am/as/eu): Sports Roundup.  
See S 0320.

1505 UK, BBC London (af): Focus on Africa. Up-to-the-minute reports on the day's events from all over the continent.

1525 Netherlands, Radio: Press Review. See Mon-Fri 1225.

1530 UK, BBC London (af): The Learning Zone. See M 1130.

1530 UK, BBC London (as): Insight (EAs). An examination of a topical aspect of the international scene.

1538 Netherlands, Radio: Newsline. See Mon-Fri 1138.

1500 UK, BBC London (am/eu): News Summary. One minute news update.

1500 USA, WEWN Birmingham AL: Life on the Rock (encore). Jeff Cavins and his weekly guest as they meet at a coffee house to discuss the joys and challenges of being a young Christian in the 90's.

1501 UK, BBC London (as): Play of the Week (SAs). A different radio drama program each week (alternative programming for South Asia).

1505 UK, BBC London (as): From Our Own Correspondent. See S 0005.

1515 UK, BBC London (af): Everywoman. See S 1130.

1515 UK, BBC London (am/eu): Short Story. Fifteen-minute dramas written by listeners from around the world.

1525 Netherlands, Radio: The Week Ahead. See S 1225.

1530 UK, BBC London (af): Short Story. See S 1515.

1530 UK, BBC London (am/eu): Pick of the World. Daire Brehan celebrates the diversity and range of the whole of BBC World Service output.

1530 UK, BBC London (as): Global Business. See S 0130.

1539 Netherlands, Radio: Wide Angle. See S 1236.

1554 Netherlands. Radio: The Sound Fountain. See S 0054.

1500 USA, WEWN Birmingham AL: Teaching of Jesus Christ. Father Groesbeck hosts this series.

1505 UK, BBC London (as): Health Matters (EAs). See M 0005.

1515 UK, BBC London (am/eu): Variable Feature. See S 0530.

1515 UK, BBC London (as): Variable Feature. See S 0530.

1530 UK, BBC London (am/eu): Composer of the Month. In depth looks at classical composers and their music. A different composer is featured each month.

1530 UK, BBC London (as): Meridian Feature. See M 0130.

1555 Netherlands, Radio: EuroQuest. See M 1253.

1500 USA, WEWN Birmingham AL: Truth Talks. See T 0200.  
1515 UK, BBC London (am/eu): Westway. See T 0130.  
1515 UK, BBC London (as): Variable Features. See S 0530.  
1530 UK, BBC London (am/eu): Everywoman. See S 1130.  
1554 Netherlands, Radio: A Good Life. See T 1253.  
1555 UK, BBC London (as): Off the Shelf (EAs). See M 0145.

1500 UK, BBC London (as): East Asia Today (EAs). News, analysis, press reviews and reports from BBC correspondents.

1500 USA, WEWB Birmingham AL: The Journey Home (encore). A call-in show that examines why so many people are being drawn home to the Catholic Church.

1515 UK, BBC London (am/eu): From Our Own Correspondent. See S 0005.

1515 UK, BBC London (as): Record News. See M 0415.

1530 UK, BBC London (am/eu): Brain of Britain 1999. See S 0430.

530 UK, BBC London (as): Meridian Live. See W 0430.

1545 UK, BBC London (as): Off the Shelf (EAs). See M 0145.

1553 Netherlands, Radio: Dutch Horizons. See S 1154.

1500 UK, BBC London (as): East Asia Today (EAs). See W  
1500.

1500 USA, WEWN Birmingham AL: Pillars of Faith  
(encore). See T 0100.

1515 UK, BBC London (am/eu): Westway. See T 0130.

1515 UK, BBC London (as): From Our Own Correspondent.  
See S 0005.

1525 Netherlands, Radio: Press Review. See Mon-Fri 1225.

1530 UK, BBC London (am/eu): The Greenfield  
Collection. See S 0430.

1530 UK, BBC London (as): Meridian Books. See H 0430.

1545 UK, BBC London (as): Off the Shelf (EAs). See M  
0145.

1554 Netherlands, Radio: Research File. See M 1153.

1500 USA, WEWN Birmingham AL: LiveWire (encore).  
Repeat of live call-in program.

1505 UK, BBC London (am/eu): Football Extra. A review  
of the week's action and the upcoming weekend  
matches.

1505 UK, BBC London (as): Football Extra. See F 1505.

1505 UK, BBC London (as): Science in Action (EAs). See  
F 0005.

1515 UK, BBC London (am/as/eu): Variable Feature. See  
S 0530.

1530 UK, BBC London (AE): Christianity at the  
Crossroads (3rd,10th,17th,24th). See M 1430.

1530 UK, BBC London (am/eu): Variable Feature. See S  
0530.

1530 UK, BBC London (as): Music Review. See S 0130.

1553 Netherlands, Radio: The Weekly Documentary. See  
W 1153.

1555 UK, BBC London (as): Off the Shelf (EAs). See M  
0145.

500 USA, WEWN Birmingham AL: Retreat Teachings.  
See S 1630.

1505 UK, BBC London (af): Sportsworld. See A 1405.

1505 UK, BBC London (am/eu): Sportsworld. See A 1405.

1505 UK, BBC London (as): Sportsworld. See A 1405.

1525 Netherlands, Radio: Insight. See S 0025.

1538 Netherlands, Radio: Europe Unzipped. See S 0038.

1554 Netherlands, Radio: Roughly Speaking. See F 1153.

## FREQUENCIES

1600-1700	Algeria, R Algiers Intl	11715af	15160me	1600-1629	Seychelles, FEBA Radio	11695as		
1600-1700	Anguilla, Caribbean Beacon	11775am		1600-1700	Sierra Leone, SLBS	5980do		
1600-1700 vl	Australia, ABC/Alice Spgs	2310do		1600-1700	South Korea, R Korea Intl	5975om	9515af	9870af
1600-1700 vl	Australia, ABC/Katherine	2485do		1600-1700	Swaziland, Trans World R	9500af		
1600-1700 vl	Australia, ABC/Tent Creek	2325do		1600-1615	Switzerland, Swiss R Intl	12010as	15185as	
1600-1700	Australia, Radio	5995as	6180va 9500as 9580va	1600-1700	Tanzania, Radio	5050af		
		11650va	11660as 17750pa	1600-1645	UAE, Radio Dubai	13630eu	13675eu	15395eu 21605eu
		17865na		1600-1700	Uganda, Radio	4976do		
1600-1630	Austria, R Austria Intl	4820do	4830do 7255do	1600-1700	UK, BBC World Service	3195as	5975as	6195as 7160as
1600-1700 vl	Botswana, Radio	9625do				9410eu	9740as	11940af 12095va
1600-1700 vl	Canada, CBC N Quebec Svc	6070do				15220am	15310as	15400af 15565eu
1600-1700	Canada, CFRX Toronto	6030do				17630as	17640va	17830af 17840am
1600-1700	Canada, CFVP Calgary	6130do				17885af	21470af	21660af
1600-1700	Canada, CHNX Halifax	6160do				3965eu	13640eu	
1600-1700	Canada, CKZN St John's	6160do		1600-1700 a	UK, Merlin Network One	9655eu		
1600-1700	Canada, CKZU Vancouver	9565af	9870af	1600-1700	UK, Merlin Network One	9655eu		
1600-1656	China, China Radio Intl	15050va		1600-1700	UK, Merlin Network One	13815na		
1600-1700	Costa Rica, RF Peace Intl	12005am	15115am 21455va	1600-1700	USA, KAJJ Dallas TX	15590na		
1600-1630	Ecuador, HCJB	15186af		1600-1700	USA, KTVN Salt Lk City UT	9930as		
1600-1700	Eqt Guinea, Radio Africa	7165af	9560af	1600-1700	USA, KWHR Naalehu HI	6035af	6110as	6160as 7125as
1600-1700	Ethiopia, Radio	11615af	11995af 12015af 15210af	1600-1700	USA, Voice of America	7215as	9645as	9700as 9760as
		17605af				13710af	15205va	15225af 15255va
1600-1645	Germany, Deutsche Welle	6140eu	6170as 7225as 9735af			15395as	15410af	
		11785as	15145af 15380as 17800af	1600-1700	USA, WEWN Birmingham AL	11875na	13615na	
		17810am	21780va	1600-1700	USA, WGTG McCaysville GA	9400va	12170am	
		15105va		1600-1700	USA, WHRA Greenbush ME	17650af		
1600-1700 s	Germany, Good News World	15105af		1600-1700	USA, WHRI Noblesville IN	13760na	15105sa	
1600-1630 s	Germany, Universal Life	15715as		1600-1700	USA, WJCR Upton KY	7490na		
1600-1630	Germany, Voice of Hope	9355as	11920as	1600-1700 s	USA, WRMI/R Miami Intl	9955am		
1600-1700	Guam, AWR/KSDA	15330as		1600-1700	USA, WRNO New Orleans LA	7395na	15420va	
1600-1630	Guam, TWR/KTWR	5950do		1600-1700	USA, WSHB Cypress Crk SC	18915af		
1600-1700	Guyana, GBC/Voice of	7250as	11680as 13605as 15150as	1600-1700	USA, WWCN Nashville TN	9475na	12160na	13845na 15685na
1600-1630	Iran, VOIRI	11690eu		1600-1700	USA, WYFR Okeechobee FL	11830na	15695eu	17510na 17760na
1600-1700	Jordan, Radio	4935do				21525va		
1600-1700	Kenya, Kenya BC Corp	6280me	11530va	1600-1615 a	Vatican City, Vatican R	12065om	13765au	15500au
1600-1700	Lebanon, Voice of Hope	4800do		1600-1620 vl	Vatican City, Vatican R	17540as		
1600-1700 vl	Lesotho, Radio	7295do		1600-1630	Vietnam, Voice of	9730eu	13740eu	
1600-1700	Malaysia, Radio	9705am		1600-1700	Zambia, Christian Voice	4965do		
1600-1630	Mexico, Radio Mexico Intl	9465as	9495as	1600-1700	Zambia, Natl BC Corp	6165do	6265do	
1600-1700	N Marianas, KFBS Saipan	6145va		1600-1630 vl	Zimbabwe, Zimbabwe BC	4828do	5012do	
1600-1650 occsnal	New Zealand, R NZ Intl	6050do		1604-1700	USA, WYFR Okeechobee FL	15215na		
1600-1700 vl	Nigeria, Radio/Ibadan	4770do		1615-1700 as	UK, BBC World Service	9515am	11860af	
1600-1700 vl	Nigeria, Radio/Kaduna	7255af	15120va	1630-1657	Canada, Radio Canada Intl	6140as	7150as	
1600-1700	Nigeria, Voice of	7230do	11570me 15320af 15335me	1630-1700	Egypt, Radio Cairo	15255af		
1600-1630	Pakistan, Radio	15465me		1630-1700	Georgia, Georgian Radio	6180me		
		9955as	9965as	1630-1700 sf	Seychelles, FEBA Radio	11695as		
1600-1700 vl	Palau, KHBN/Voice of Hope	4890do		1630-1700 vl	Zimbabwe, Zimbabwe BC	3306do	4828do	
1600-1700	Papua New Guinea, NBC	4730me	4940me 4975me 7325me	1645-1700	Germany, Deutsche Welle	6140eu		
	Russia, Voice of Russia WS	9480eu	9730eu 11500as 12070me	1645-1700	Tajikistan, Radio	7245as		
		9525af		1650-1700 twhfa	New Zealand, R NZ Intl	11675va		

## SELECTED PROGRAMS

## Daily

1600 UK, BBC London (af/am/as/eu): World News. See S 0000.

## Monday-Friday

1645 UK, BBC London (af/am/eu): Insight. See M 1530.  
1645 UK, BBC London (as): World Business Report. See S 0330.

## Sundays

1605 UK, BBC London (af): Concert Hall. Classical music concerts.  
1605 UK, BBC London (am/eu): Sunday Sportsworld. The Sunday sports magazine.  
1615 UK, BBC London (as): Short Story. See S 1515.  
1630 UK, BBC London (as): Jazzmatazz. The request program that lives up to its title.  
1630 USA, WEWN Birmingham AL: Moral Decisions. No information available.  
1655 UK, BBC London (am/eu): Spotlight. Focus on the theater.

## Mondays

1600 USA, WEWN Birmingham AL: The Best of Journey Home. See S 1630.  
1615 UK, BBC London (af): Fast Track. The latest African sports news and action.

1615 UK, BBC London (am/eu): Variable Feature. See S 0530.  
1615 UK, BBC London (as): The UK Top Twenty. Tim Smith presents the UK's pop countdown.  
1630 UK, BBC London (am/eu): The Farming World. See S 0415.

## Tuesdays

1600 USA, WEWN Birmingham AL: Reasons of Faith. See M 0430.  
1615 UK, BBC London (af): African Perspective. A considered view of life and issues facing the African continent.  
1615 UK, BBC London (as): John Peel. See T 0230.  
1630 UK, BBC London (am/eu): The Vintage Chart Show. See M 0530.

## Wednesdays

1600 UK, BBC London (am/eu): Europe Today. All the latest news, analysis and comment.  
1600 USA, WEWN Birmingham AL: The Best of Life on the Rock. See S 1500.  
1615 UK, BBC London (af): Talkabout Africa. Telephone conversations with BBC correspondents on late-breaking African events.  
1615 UK, BBC London (as): Variable Music Feature. See M 0230.  
1630 UK, BBC London (am/eu): Jazzmatazz. See S 1630.

## Thursdays

1600 USA, WEWN Birmingham AL: Faith and Family (live). Steve Wood, president of the Family Life Center International and St. Joseph's Covenant Keepers, and his guests take listeners' calls, faxes and e-mails.  
1615 UK, BBC London (af): Art Beat. See S 0430.  
1615 UK, BBC London (am/eu): Variable Music Feature. See M 0230.  
1615 UK, BBC London (as): The Vintage Chart Show. See M 0530.

## Fridays

1600 USA, WEWN Birmingham AL: Moments of Truth (live). Johnette Benkovic.  
1615 UK, BBC London (af): Fast Track. See M 1615.  
1615 UK, BBC London (am/eu): John Peel. See T 0230.  
1615 UK, BBC London (as): Andy Kershaw's World of Music. See W 0530.

## Saturdays

1600 USA, WEWN Birmingham AL: The Catholic Broadcast. See S 1230.  
1605 UK, BBC London (af): Sportsworld. See A 1405.  
1605 UK, BBC London (am/eu): Sportsworld. See A 1405.  
1605 UK, BBC London (as): Sportsworld. See A 1405.  
1630 USA, WEWN Birmingham AL: Household of Faith. See M 0430.

## FREQUENCIES

1700-1800	Anguilla,Caribbean Beacon	11775am				1800-1900	Anguilla,Caribbean Beacon	11775am			
1700-1800 vl	Australia, ABC/Alice Spgs	2310do				1800-1900 mtwhf	Argentina, RAE	15345eu			
1700-1800 vl	Australia, ABC/Katherine	2485do				1800-1900 vl	Australia, ABC/Alice Spgs	2310do			
1700-1800 vl	Australia, ABC/Tent Creek	2325do				1800-1900 vl	Australia, ABC/Katherine	2485do			
1700-1800	Australia, Radio	5995as	6180va	9500as	9580va	1800-1900 vl	Australia, ABC/Tent Creek	2325do			
		9660va	11880va			1800-1900	Australia, Radio	6080pa	7240va	9500as	9580va
		4820do	4830do	7255do				9660va	11880va		
1700-1800 vl	Botswana, Radio	4820do				1800-1830	Azerbaijan, R Dada Gorgud	9165me			
1700-1800 vl	Canada, CBC N Quebec Svc	9625do				1800-1900	Bangladesh, Bangla Betar	7185eu	7462eu	9548eu	15520eu
1700-1800	Canada, CFRX Toronto	6070do				1800-1900 vl	Botswana, Radio	4820do			
1700-1800	Canada, CFVP Calgary	6030do				1800-1900	Canada, CFRX Toronto	6070do			
1700-1800	Canada, CHNX Halifax	6130do				1800-1900	Canada, CFVP Calgary	6030do			
1700-1800	Canada, CKZN St John's	6160do				1800-1900	Canada, CHNX Halifax	6130do			
1700-1800	Canada, CKZU Vancouver	6160do				1800-1900	Canada, CKZN St John's	6160do			
1700-1756	China, China Radio Intl	5220af	7405af	9570af	9745af	1800-1900	Canada, CKZU Vancouver	6160do			
		11910af	15300af	15310af		1800-1900	Costa Rica,RF Peace Intl	15050va			
1700-1800	Costa Rica,RF Peace Intl	15050va				1800-1900	Czech Rep, R Prague Intl	5930eu	7315va		
1700-1727	Czech Rep, R Prague Intl	5930eu	17485af			1800-1827	Egypt, Radio Cairo	15255af			
1700-1800	Egypt, Radio Cairo	15255af				1800-1830	Eqt Guinea, Radio Africa	15186af			
1700-1800	Eqt Guinea, Radio Africa	15186af				1800-1900	Georgia, Georgian Radio	11910eu			
1700-1730	France, Radio France Intl	15210af	17605af			1800-1830	Germany, Deutsche Welle	6140eu			
1700-1800	Germany, Deutsche Welle	6140eu				1800-1900	Ghana, Ghana BC Corp	3366do	4915do		
1700-1800 a	Germany, Good News World	11795va				1800-1830	Greece, Voice of	7450eu	9425eu	15485na	17705na
1700-1800	Germany, Voice of Hope	11725as				1800-1815	Guyana, GBC/Voice of	5950do			
1700-1800	Ghana, Ghana BC Corp	3366do	4915do			1800-1900	India, All India Radio	7410eu	9950eu	11620eu	13780af
1700-1800	Guyana, GBC/Voice of	5950do						15075af			
1700-1800	Japan, Radio/NHK	7110eu	9535na	9825as	15355af	1800-1900 vl	Italy, IRRS	3985va			
1700-1730	Jordan, Radio	11690eu				1800-1900	Kenya, Kenya BC Corp	4935do			
1700-1800	Kenya, Kenya BC Corp	4935do				1800-1900	Kuwait, Radio	11990am			
1700-1800	Lebanon, Voice of Hope	6280me	11530va			1800-1900 vl	Lesotho, Radio	4900do			
1700-1800 vl	Lesotho, Radio	4800do				1800-1815	Liberia,LCN/R Liberia Int	5100do			
1700-1800	Malaysia, Radio	7295do				1800-1810 vl/m-f	Malawi, MBC	5993do			
1700-1800	N Marianas, KFBS Saipan	9465as				1800-1900	Malaysia, Radio	7295do			
1700-1800 twhfa	New Zealand, R NZ Intl	11675va				1800-1900	N Marianas, KFBS Saipan	9465as			
1700-1800 vl	Nigeria, Radio/Ibadan	6070do				1800-1900 vl	Nigeria, Radio/Ibadan	6050do			
1700-1800 vl	Nigeria, Radio/Kaduna	4770do				1800-1900 vl	Nigeria, Radio/Kaduna	4770do			
1700-1800	Nigeria, Radio/Lagos	3326do				1800-1900	Nigeria, Radio/Lagos	3326do			
1700-1730 t	Pakistan, Radio	11570me	15335me			1800-1900 vl	Nigeria, Voice of	7255af	15120va		
1700-1800	Palau, KHBN/Voice of Hope	9955as	9965as			1800-1900	North Korea, R Pyongyang	6575eu	9335eu	11710am	13760am
1700-1800 vl	Papua New Guinea, NBC	4890do				1800-1900	Palau, KHBN/Voice of Hope	9965as			
1700-1756	Romania, R Romania Intl	15270eu	15380eu	17735eu	17865eu	1800-1900 vl	Papua New Guinea, NBC	4890do			
1700-1800	Russia,Voice of Russia WS	9675me	9730eu	12005as	12070me	1800-1900	Philippines, R Pilipinas	11720as	15190as	17720as	
1700-1800 vl	S Africa, Channel Africa	17870af				1800-1900	Poland, Polish R Warsaw	6095eu	7285eu	9525eu	
1700-1800	Sierra Leone, SLBS	5980do				1800-1900	Russia,Voice of Russia WS	7300eu	9480eu	9720eu	9775eu
1700-1800	Tanzania, Radio	5050af						11510af	12065af		
1700-1800	Uganda, Radio	4976do				1800-1900 smwhfa	Russia,Voice of Russia WS	9820eu			
1700-1800	UK, BBC World Service	3195as	3255af	5975as	6190af	1800-1830	S Africa, AWR Africa	5960af	6100af		
		6195va	7160as	9410eu	9510as	1800-1900 vl	S Africa, Channel Africa	3215af	17870af		
	9740as	11955me	11980me	12095va	15400af	1800-1900	Sierra Leone, SLBS	3316do			
	15565eu	17630as	17640eu	17830af	17840va	1800-1900 vl	Solomon Islands, SIBC	5020do			
1700-1745	UK, BBC World Service	9630af				1800-1810	Somalia, Radio Mogadishu	6690af			
1700-1800 a	Uk, Merlin Network One	3965eu	13640eu			1800-1900	Swaziland, Radio Omdurman	9200va			
1700-1800 mtwhf	UK, Merlin Network One	6185eu				1800-1830	Sudan, Trans World R	9500af			
1700-1800	USA, KAIJ Dallas TX	13815na				1800-1900	Swaziland, Trans World R	3200af			
1700-1800	USA, KTVN Salt Lk City UT	15590na				1800-1900	Taiwan, Radio Taipei Intl	3955eu			
1700-1800	USA, KWHR Naalehu HI	9930as				1800-1900	Tanzania, Radio	5050af			
1700-1800	USA, Voice of America	6110as	6190as	7125as	7170as	1800-1900	UK, BBC World Service	3255af	3955eu	6190af	6195eu
		9645as	9700me	9760af	15255va			9410va	9740pa	11955me	11980me
		15395as	15410af	15445af	17895af			15400af	15565eu	17830af	17840am
1700-1800 mtwhf	USA, Voice of America	5990as	6045as	7150as	9550as			12095eu	6195as	9510as	
		9770as	11870as			1800-1830	UK, BBC World Service	3975as			
1700-1800	USA, WEWN Birmingham AL	11875na	13615na			1800-1900	UK, Merlin Network One	3965eu			
1700-1800	USA, WGTG McCaysville GA	9400va	12170am			1800-1900	USA, KAIJ Dallas TX	13815na			
1700-1800	USA, WHRA Greenbush ME	17650af				1800-1900	USA, KJES Vado NM	15385na			
1700-1800	USA, WHRI Noblesville IN	13760na	15105na			1800-1900	USA, KTVN Salt Lk City UT	15590na			
1700-1800	USA, WINB Red Lion PA	13800eu				1800-1900	USA, KWHR Naalehu HI	9930as			
1700-1800	USA, WJCR Upton KY	7490na				1800-1900	USA, Voice of America	6035af	7415af	9760af	9770me
1700-1800 irreg	USA, WMLK Bethel PA	9465am						13820as	15410af	15580af	17895af
1700-1800	USA, WRNO New Orleans LA	7395na	15420va			1800-1900	USA, WEWN Birmingham AL	11875na			
1700-1800	USA, WSHB Cypress Crk SC	18915af				1800-1900	USA, WGTG McCaysville GA	9400va	12170am		
1700-1800	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	1800-1900	USA, WHRA Greenbush ME	17650af			
1700-1800	USA, WYFR Okeechobee FL	15695eu	17510eu			1800-1900	USA, WHRI Noblesville IN	9495sa	13760na		
1700-1727	Vietnam, Voice of	12070eu				1800-1900	USA, WINB Red Lion PA	13800eu			
1700-1800	Zambia, Christian Voice	4965do				1800-1900	USA, WJCR Upton KY	7490na			
1700-1800	Zambia, Natl BC Corp	6165do	6265do			1800-1900 irreg	USA, WMLK Bethel PA	9465am			
1700-1800 vl	Zimbabwe, Zimbabwe BC	3306do	4828do			1800-1900	USA, WRNO New Orleans LA	7395na	15420va		
1715-1800 vl	Libya, Voice of Africa	15235va	15415va	15435va		1800-1900	USA, WSHB Cypress Crk SC	15665eu	18915af		
1715-1800	Swaziland, Trans World R	3200af				1800-1900	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na
1715-1730	Vatican City, Vatican R	4005eu	5883eu	7250eu	9645eu	1800-1845	USA, WYFR Okeechobee FL	15895eu			
		15595eu				1800-1900 vl	Vanuatu, Radio	4960do			
1720-1750 fa	Armenia, Trans World R	7375eu				1800-1827	Vietnam, Voice of	9730eu	13740eu		
1720-1750	Monaco, Trans World Radio	7375as				1800-1900	Yemen, Rep of Yemen Radio	9780do			
1730-1800	Austria, R Austria Intl	6155va	9655va	13710va	13730va	1800-1900	Zambia, Christian Voice	4965do			
1730-1800	Guam, AWR/KSDA	11560as	11965as			1800-1900	Zambia, Natl BC Corp	6165do	6265do		
1730-1800	Netherlands, Radio	6020af	11655af			1800-1900 vl	Zimbabwe, Zimbabwe BC	3306do	4828do		
1730-1800	Philippines, R Pilipinas	11720as	15190as	17720as		1830-1900	Ascension Is,RTE Radio	21630af			
1730-1800	S Africa, AWR Africa	12130af				1830-1856	Belgium, R Vlaanderen Intl	5910eu	9925eu	13600eu	17695af
1730-1800	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu		1830-1900 as	Georgia, Georgian Radio	6080me			
1730-1800	Vatican City, Vatican R	13765af	15570af	17550af		1830-1900	Kiribati, Radio	9810do			
1745-1800	Bangladesh, Bangla Betar	7185eu	7462eu	9548eu	15520eu	1830-1900	Netherlands, Radio	6020af	9895af	11655af	13700af
1745-1800	India, All India Radio	3315do	3345do	7410eu	9635af			17605af			
	9950eu	11620eu	11935af	13780af	15200af	1830-1900 w	Philippines, FEBC R Intl	9465eu			
						1830-1900 mtwhfa	Sweden, Radio	6065eu			
						1830-1900 s	Sweden, Radio	7345eu			
						1830-1900	UK, BBC World Service	9630af			
						1830-1900 as	USA, Voice of America	7170af	11940af	15525af	
						1840-1850	Greece, Voice of	12105af	15630af		
						1850-1900	New Zealand, R NZ Intl	11675va			





## FREQUENCIES

1900-2000	Anguilla, Caribbean Beacon	11775am				2000-2100	Australia, Radio	9500as	9580va	11880va
1900-2000 vl	Australia, ABC/Katherine	2485do				2000-2100 vl	Botswana, Radio	12080va		
1900-2000 vl	Australia, ABC/Tent Creek	2325do				2000-2100	Bulgaria, Radio	4820do	4830do	
1900-2000	Australia, Radio	6080pa	7240va	9500as	9580va	2000-2100	Canada, CFRX Toronto	5845eu	7335eu	
		9660va	11880va			2000-2100	Canada, CFVP Calgary	6070do		
1900-2000 vl	Botswana, Radio	4820do	4830do			2000-2100	Canada, CHNX Halifax	6030do		
1900-2000	Canada, CFRX Toronto	6070do				2000-2100	Canada, CKZN St John's	6130do		
1900-2000	Canada, CFVP Calgary	6030do				2000-2100	Canada, CKZU Vancouver	6160do		
1900-2000	Canada, CHNX Halifax	6130do				2000-2056	China, China Radio Intl	6950eu	7590eu	9440af
1900-2000	Canada, CKZN St John's	6160do						11840af	11975af	15500af
1900-2000	Canada, CKZU Vancouver	6160do				2000-2100	Costa Rica, RF Peace Intl	15050va		
1900-1956	China, China Radio Intl	9440af	11750af	11840af	13650af	2000-2100	Ecuador, HCJB	17660eu	21455va	
		15360af				2000-2100	Eqt Guinea, Radio Africa	15186af		
1900-2000	Costa Rica, RF Peace Intl	15050va				2000-2045	Germany, Deutsche Welle	9725eu		
1900-2000	Ecuador, HCJB	17660eu	21455va			2000-2100	Germany, Overcomer Ministr	3965eu		
1900-2000	Eqt Guinea, Radio Africa	15186af				2000-2030	Ghana, Ghana BC Corp	3366do	4915do	
1900-1945	Germany, Deutsche Welle	11765af	11785af	11810af	13610af	2000-2100	Guatemala, Adv World R	5980am		
		15135af	15390af	17810af		2000-2100	Guyana, GBC/Voice of	5950do		
		7450eu	9425eu	15485na	17705sa	2000-2030	Hungary, Radio Budapest	6025eu	7165eu	
1900-2000 s	Greece, Voice of	7475eu	9375eu			2000-2100	Indonesia, Voice of	15150va		
1900-1910	Greece, Voice of	5980am				2000-2030	Iran, VOIRI	7215eu	9022eu	9880eu
1900-2000	Guatemala, Adv World R	5950do				2000-2100 irreg	Iraq, Radio Iraq Intl	11786am		
1900-2000	Guyana, GBC/Voice of	7410eu	9635af	9950eu	11620eu	2000-2030	Israel, Kol Israel	9435va	11605va	15640af
1900-1945	India, All India Radio	11935af	13780af	15200af		2000-2100 vl	Italy, IRRS	3985va	4935do	15650va
		3985va				2000-2100	Kenya, Kenya BC Corp	4885do		
1900-2000 vl	Italy, IRRS	4885do	4935do			2000-2100	Kiribati, Radio	9810do		
1900-2000	Kenya, Kenya BC Corp	9810do				2000-2100	Kuwait, Radio	11990am		
1900-2000	Kiribati, Radio	11990am				2000-2100 vl	Lesotho, Radio	4800do		
1900-2000	Kuwait, Radio	4800do				2000-2055	Liberia, LCN/R Liberia Int	5100do		
1900-2000 vl	Lesotho, Radio	5100do				2000-2100	Malaysia, Radio	7295do		
1900-1915	Liberia, LCN/R Liberia Int	7295do				2000-2100 mtwhfa	Malta, VO Mediterranean	12060eu		
1900-2000	Malaysia, Radio	9465as				2000-2030	Mongolia, Voice of	9720eu	12085eu	
1900-2000	N Marianas, KFBS Saipan	11695va				2000-2100	Namibia, NBC	3270af	3289af	
1900-1950	New Zealand, R NZ Intl	6050do				2000-2100	New Zealand, R NZ Intl	17675va		
1900-2000 vl	Nigeria, Radio/Ibadan	4770do				2000-2015 vl	Niger, Voice du Sahel	5019do		
1900-2000 vl	Nigeria, Radio/Kaduna	3326do				2000-2100 vl	Nigeria, Radio/Ibadan	6050do		
1900-2000	Nigeria, Radio/Lagos	7255af	15120va			2000-2100 vl	Nigeria, Radio/Kaduna	4770do		
1900-2000	Nigeria, Voice of	6520eu	9600me	9975af		2000-2100	Nigeria, Radio/Lagos	3326do		
1900-2000	North Korea, R Pyongyang	4890do				2000-2100	Nigeria, Voice of	7255af	15120va	
1900-1930 m-a/vl	Papua New Guinea, NBC	11720as	15190as	17720as		2000-2100 vl	Papua New Guinea, NBC	9675do		
1900-1930	Philippines, R Pilipinas	7300eu	7330eu	9480eu	9720eu	2000-2100	Russia, Voice of Russia WS	7300eu	9720eu	9775eu
1900-2000	Russia, Voice of Russia WS	9775eu	9820eu	9865eu	11510af					9820eu
		11985eu	12025af	12065af						
1900-2000	Sierra Leone, SLBS	3316do				2000-2005	S Africa, Voice of Hope	6290af		
1900-2000 vl	Solomon Islands, SIBC	5020do				2000-2030	Serbia, Radio Yugoslavia	7230ua		
1900-2000	South Korea, R Korea Intl	5975om	7275eu			2000-2100	Sierra Leone, SLBS	3316do		
1900-2000	Swaziland, Trans World R	3200af				2000-2100 vl	Solomon Islands, SIBC	5020do		
1900-1930	Tanzania, Radio	5050af				2000-2100	Swaziland, Trans World R	3200af		
1900-2000	Thailand, Radio	7210eu	9655eu	11905eu		2000-2030	Switzerland, Swiss R Intl	6165eu	9620af	11910af
1900-2000	Uganda, Radio	4976do						13790af		13660af
1900-2000	UK, BBC World Service	3255af	3955eu	6190af	6195eu	2000-2030	Turkey, Voice of	9630eu	9895eu	
		9410va	9630me	9740pa	11955me	2000-2100	Uganda, Radio	4976do		
		11980me	12095va	15400af	15565eu	2000-2100	UK, BBC World Service	3255af	3955eu	5975pa
								9410va	9630af	9740pa
1900-2000 a	UK, BBC World Service	17840am						11980me	12095va	15400af
1900-2000	UK, Merlin Network One	6180eu								
1900-2000	USA, KALJ Dallas TX	13815na				2000-2100	USA, KALJ Dallas TX	13815na		
1900-2000	USA, KLTN Salt Lk City UT	15590na				2000-2100	USA, KLTN Salt Lk City UT	15590na		
1900-2000	USA, KWHR Naalehu HI	9930as				2000-2100	USA, KWHR Naalehu HI	17510as		
1900-2000	USA, Voice of America	4950af	6035af	7375af	7415af	2000-2100	USA, Voice of America	4950af	6035af	6095me
		9525pa	9760af	9770af	11870pa			9760af	9770af	11855af
		15180pa	15410af	15445af	15580af			15445af	15580af	17725af
1900-1930 as	USA, Voice of America	4950af						15410af		17745af
1900-2000	USA, WEWN Birmingham AL	11875na	13615na			2000-2100	USA, WEWN Birmingham AL	11875na		
1900-2000	USA, WGTG McCaysville GA	9400va	12170am			2000-2100	USA, WGTG McCaysville GA	9400va		
1900-2000	USA, WHRA Greenbush ME	17650af				2000-2100	USA, WHRA Greenbush ME	17650af		
1900-2000	USA, WHRI Noblesville IN	9495na	13760na			2000-2100	USA, WHRI Noblesville IN	9495na	13760na	
1900-2000	USA, WINB Red Lion PA	13800eu				2000-2100	USA, WINB Red Lion PA	13790eu		
1900-2000	USA, WJCR Upton KY	7490na				2000-2100	USA, WJCR Upton KY	7490na		
1900-2000 a	USA, WRMI/R Miami Intl	9955am				2000-2100 as	USA, WRMI/R Miami Intl	9955am		
1900-2000	USA, WRNO New Orleans LA	7395na	15420va			2000-2100	USA, WRNO New Orleans LA	7395na	15420va	
1900-2000	USA, WSHB Cypress Crk SC	15665eu	18915af			2000-2100	USA, WSHB Cypress Crk SC	11550eu	13770eu	15665af
1900-2000	USA, WWCR Nashville TN	9475na	12160na	13845na	15685na	2000-2100	USA, WWCR Nashville TN	9475na	12160na	13845na
1900-2000	USA, WYFR Okeechobee FL	5760eu				2000-2100	USA, WYFR Okeechobee FL	5760eu	7355eu	15565eu
1900-2000 vl	Vanuatu, Radio	4960do				2000-2100 vl	USA, WYFR Okeechobee FL	5760na	7355na	15565na
1900-1927	Vietnam, Voice of	9730eu	13740eu			2000-2010	Vanuatu, Radio	4960do		
1900-2000	Zambia, Christian Voice	4965do				2000-2100	Vatican City, Vatican R	9660af	11625af	13765va
1900-2000	Zambia, Natl BC Corp	6165do	6265do			2000-2100	Zambia, Christian Voice	4965do		
1900-2000 vl	Zimbabwe, Zimbabwe BC	3306do	4828do			2000-2100 vl	Zambia, Natl BC Corp	6165do	6265do	
1930-2000	Georgia, Georgian Radio	11760eu				2000-2100	Zimbabwe, Zimbabwe BC	3306do	4828do	
1930-2000	Iran, VOIRI	7215eu	9022eu	9880as		2005-2010	Syria, Radio Damascus	12085eu	13610eu	
1930-2000	Netherlands, Radio	6020af	9895af	11655af	13700af	2010-2030	Vatican City, Vatican R	9660af	11625af	13765va
		17605af				2015-2030	Albania, R Tirana Intl	7180eu	9510eu	
1930-2000	Serbia, Radio Yugoslavia	6100eu	9720eu			2015-2100 vl	Libya, Voice of Africa	15235va	15415va	15435va
1930-2000	Slovakia, R Slovakia Intl	5915eu	6055eu	7345eu		2025-2045	Italy, RAI Intl	7220af	9710af	11880af
1930-2000	Turkey, Voice of	9630eu	9895eu	9760eu		2030-2100 th	Belarus, R Minsk	7105va	7210va	
1935-1955	Italy, RAI Intl	5970eu				2030-2100	Cuba, Radio Havana	13680eu	13715eu	13750eu
1950-2000 smtwh	New Zealand, R NZ Intl	17675va				2030-2100	Egypt, Radio Cairo	15375af		
1956-2000	S Africa, Voice of Hope	6290af				2030-2100	Germany, AWR Europe	15560af		
1958-2000 smtwh	New Zealand, R NZ Intl	17675va				2030-2055	Moldova, R Moldova Intl	7520eu		
						2030-2100	Poland, Polish R Warsaw	6035eu	6095eu	7285eu
						2030-2100	S Africa, AWR Africa	9745af		9525eu
						2030-2100	Sweden, Radio	6065eu	9680eu	11905eu
						2030-2045	Thailand, Radio	9655eu		
						2030-2100 as	USA, Voice of America	4950af		
						2030-2100	Uzbekistan, R Tashkent	9540eu	9545va	
						2030-2057	Vietnam, Voice of	9730eu	13740eu	
						2045-2100	India, All India Radio	7150au	9650eu	9910au
								9950eu	11620eu	11715eu
								4005eu	5883eu	7250eu
						2050-2100	Vatican City, Vatican R			9645eu

## 2000 UTC

## FREQUENCIES

2100-2200	Anguilla, Caribbean Beacon	11775am			
2100-2130 vl	Australia, ABC/Alice Spgs	2310do			
2100-2130 vl	Australia, ABC/Katherine	2485do			
2100-2200 vl	Australia, ABC/Katherine	5025do			
2100-2130 vl	Australia, ABC/Tent Creek	2325do			
2100-2130	Australia, Radio	7240pa	9500as	9580va	9660pa
		11880va	12080va	17580va	21740va
		3356do			
2100-2200 vl	Botswana, Radio	9625do			
2100-2200 vl	Canada, CBC N Quebec Svc	6070do			
2100-2200	Canada, CFRX Toronto	6030do			
2100-2200	Canada, CFVP Calgary	6130do			
2100-2200	Canada, CHNX Halifax	6160do			
2100-2200	Canada, CKZN St John's	6160do			
2100-2200	Canada, CKZU Vancouver	5995va	7235va	9770va	9805va
2100-2200	Canada, Radio Canada Intl	11945va	13650va	13690va	17820va
			6950eu	7110eu	7590eu
2100-2130	China, China Radio Intl	9535eu	11975af	15500eu	
		15050va			
2100-2200	Costa Rica, RF Peace Intl	11605af			
2100-2105	Croatia, Croatian Radio	13750eu			
2100-2130	Cuba, Radio Havana	5930na	9430as		
2100-2127	Czech Rep, R Prague Intl	15300eu	21455va		
2100-2200	Ecuador, HCJB	15375af			
2100-2200	Egypt, Radio Cairo	15186af			
2100-2200	Eqi Guinea, Radio Africa	9615af	9690af	9765as	15135va
2100-2145	Germany, Deutsche Welle	15410sa	17560va		
		5950do			
2100-2200	Guyana, GBC/Voice of	7150au	7410eu	9650eu	9910au
2100-2200	India, All India Radio	9950eu	11620eu	11715eu	
		3985va			
2100-2200 vl	Italy, IRRS	6035pa	9725eu	17825na	21610pa
2100-2200	Japan, Radio/NHK	4885do	4935do		
2100-2130	Kenya, Kenya BC Corp	9810do			
2100-2130	Kiribati, Radio	4800do			
2100-2200 vl	Lesotho, Radio	5100do			
2100-2115	Liberia, LCN/R Liberia Int	7295do			
2100-2200	Malaysia, Radio	3270af	3289af		
2100-2200	Namibia, NBC	17675va			
2100-2200	New Zealand, R NZ Intl	6050do			
2100-2200 vl	Nigeria, Radio/Ibadan	4770do			
2100-2200 vl	Nigeria, Radio/Kaduna	3326do			
2100-2200	Nigeria, Radio/Lagos	6575eu	9335as	9405as	11710am
2100-2200	North Korea, R Pyongyang	13760am			
		9985as			
2100-2200	Palau, KHBN/Voice of Hope	9675do			
2100-2200 vl	Papua New Guinea, NBC	6035eu	6095eu	7285eu	9525eu
2100-2130	Poland, Polish R Warsaw	9570eu	11725eu	11810eu	11840eu
2100-2200	Romania, R Romania Intl	15180eu			
		7300eu	7440eu	9480eu	9720eu
2100-2200	Russia, Voice of Russia WS	9775eu	9820eu	12070eu	
		3316do			
2100-2200	Sierra Leone, SLBS	5020do			
2100-2200 vl	Solomon Islands, SIBC	3970eu	6480eu	15575eu	
2100-2130	South Korea, R Korea Intl	9595af	9680eu		
2100-2200 mtwhf	Spain, R Exterior Espana	3200af			
2100-2200	Swaziland, Trans World R	3255af	3915as	3955eu	5965as
2100-2200	UK, BBC World Service	5975va	6005af	6180eu	6190af
		9410va	9740pa	11945as	12095va
		6195va			
2100-2200	USA, KAIJ Dallas TX	13815na			
2100-2200	USA, KTBN Salt Lk City UT	15590na			
2100-2200	USA, KWHR Naalehu HI	17510as			
2100-2200	USA, Voice of America	6035af	6040me	7375af	7415af
		9535af	9705as	11870pa	11975af
		15185as	15445af	15580af	17725af
		15410af	15445af	17725af	17735as
			7415na		
2100-2200	USA, WBCQ Monticello ME	9385eu	11875na		
2100-2200	USA, WEWN Birmingham AL	9400va	12170am		
2100-2200	USA, WGTG McCaysville GA	17650af			
2100-2200	USA, WHRA Greenbush ME	5745na	9495sa		
2100-2200	USA, WHRI Noblesville IN	13790eu			
2100-2200	USA, WINB Red Lion PA	7490na			
2100-2200	USA, WJCR Upton KY	9955am			
2100-2200 as	USA, WRMI/R Miami Intl	7395na	15420va		
2100-2200	USA, WRNO New Orleans LA	11550eu	13770eu	15665af	
2100-2200	USA, WSHB Cypress Crk SC	7435na	9475na	12160na	13845na
2100-2200	USA, WWCR Nashville TN	7355va	15565af	21525af	
2100-2200	USA, WYFR Okeechobee FL	5760na			
2100-2145	USA, WYFR Okeechobee FL	4960do			
2100-2200 vl	Vanuatu, Radio	4005eu	7250eu	9645eu	
2100-2110	Vatican City, Vatican R	4965do			
2100-2200	Zambia, Christian Voice	6165do	6265do		
2100-2200	Zambia, Natl BC Corp	3306do	4828do		
2100-2200 vl	Zimbabwe, Zimbabwe BC	12085na	13610na		
2105-2200	Syria, Radio Damascus	7475au	9425au		
2110-2200 s	Greece, Voice of	4810va	9965va		
2115-2145 mtwhfa	Armenia, Voice of	9990eu			
2115-2200	Egypt, Radio Cairo	4910do			
2130-2200 vl	Australia, ABC/Tent Creek	7240pa	9660pa	11880va	12080va
2130-2200	Australia, Radio	17580pa	21740va		
		7105va	7210va		
2130-2200 th	Belarus, R Minsk	15550as			
2130-2200	Guam, AWR/KSDA	11740as	13745as		
2130-2200	Iran, VOIRI	7520eu			
2130-2155	Moldova, R Moldova Intl	15575eu			
2130-2200	South Korea, R Korea Intl	9525as			
2130-2200	Turkey, Voice of				

2130-2200	USA, Voice of America	6040me	9535af	9705as	11870pa
		15185as	17735as		
2130-2200 smtwhf	USA, Voice of America	6035af	7375af	7415af	11975af
		15410af	15445af	15580af	17725af
2130-2200	Uzbekistan, R Tashkent	9540eu	9545va		

## 2200 UTC

2200-2300	Anguilla, Caribbean Beacon	6090am			
2200-2300 vl	Australia, ABC/Katherine	5025do			
2200-2300 vl	Australia, ABC/Tent Creek	4910do			
2200-2300	Australia, Radio	17580va	17795va	21740va	
2200-2300	Bulgaria, Radio	7535eu	7545eu		
2200-2300	Canada, CBC N Quebec Svc	9625do			
2200-2300	Canada, CFRX Toronto	6070do			
2200-2300	Canada, CFVP Calgary	6030do			
2200-2300	Canada, CHNX Halifax	6130do			
2200-2300	Canada, CKZN St John's	6160do			
2200-2300	Canada, CKZU Vancouver	6160do			
2200-2259	Canada, Radio Canada Intl	5995va	7235va	9805va	11705as
		13690va	15325va		
		5970eu	7175eu		
2200-2256	China, China Radio Intl	15050va			
2200-2300	Costa Rica, RF Peace Intl	9990eu			
2200-2245	Egypt, Radio Cairo	15186af			
2200-2300	Eqi Guinea, Radio Africa	5995eu	9715eu	9795eu	9875eu
2200-2300	Germany, Overcomer Ministr	11655eu			
		3366do	4915do		
2200-2215	Ghana, Ghana BC Corp	7475au	9425au		
2200-2205 s	Greece, Voice of	5950do			
2200-2300	Guyana, GBC/Voice of	6025eu			
2200-2230	Hungary, Radio Budapest	7150au	7410eu	9650eu	9910au
2200-2230	India, All India Radio	9950eu	11620eu	11715eu	
		11740as	13745as		
2200-2230	Iran, VOIRI	9685va			
2200-2230 irreg	Iraq, Radio Iraq Intl	3985va			
2200-2300	Italy, IRRS	9675as	11900as	15240as	
2200-2225	Italy, RAI Intl	5100do			
2200-2215	Liberia, LCN/R Liberia Int	7295do			
2200-2300	Malaysia, Radio	3270af	3289af		
2200-2300	Namibia, NBC	17675va			
2200-2300	New Zealand, R NZ Intl	6050do			
2200-2300 vl	Nigeria, Radio/Ibadan	4770do			
2200-2300 vl	Nigeria, Radio/Kaduna	3326do			
2200-2300	Nigeria, Radio/Lagos	9955as	9965as	9985as	
2200-2300 vl	Papua New Guinea, NBC	9675do			
2200-2230	Serbia, Radio Yugoslavia	6100eu	6185eu		
2200-2300	Sierra Leone, SLBS	3316do			
2200-2300 vl	Solomon Islands, SIBC	5020do			
2200-2300 as	Spain, R Exterior Espana	9595af	9680eu		
2200-2215	Swaziland, Trans World R	3200af			
2200-2205	Syria, Radio Damascus	12085eu	13610na		
2200-2300	Taiwan, Radio Taipei Intl	11565eu	15600eu		
2200-2300	UK, BBC World Service	3915as	3955eu	5965as	5975va
		6195eu	6195as	7110as	9410eu
		9915va	11835af	11955as	12080pa
2200-2300 f	UK, Merlin Network One	6170eu	7165eu	12095na	15400af
2200-2300	Ukraine, Radio	4820eu	5905eu	6020eu	6030va
		6080eu	7205eu	9560eu	9610va
2200-2300	USA, KAIJ Dallas TX	13815na			
2200-2300	USA, KTBN Salt Lk City UT	15590na			
2200-2300	USA, KWHR Naalehu HI	17510as			
2200-2230 mtwhf	USA, Voice of America	6035af	7215as	7340af	7375as
		7415af	9770as	11760as	11975af
		15185as	15290as	17335as	17820as
2200-2300	USA, WBCQ Monticello ME	7415na			
2200-2300	USA, WEWN Birmingham AL	9385eu	13615na		
2200-2300	USA, WGTG McCaysville GA	9400va	12170am		
2200-2300	USA, WHRA Greenbush ME	17650af			
2200-2300	USA, WHRI Noblesville IN	5745na	9495sa		
2200-2300	USA, WINB Red Lion PA	13790eu			
2200-2300	USA, WJCR Upton KY	7490na			
2200-2230 as	USA, WRMI/R Miami Intl	9955am			
2200-2300	USA, WRNO New Orleans LA	7395na	15420va		
2200-2300	USA, WSHB Cypress Crk SC	7510eu	13770eu	15285sa	
2200-2300	USA, WTJC Newport NC	9370am			
2200-2300	USA, WWCR Nashville TN	5070na	7435na	9475na	13845na
2200-2245	USA, WYFR Okeechobee FL	15565va	21525af		
2200-2300	USA, WYFR Okeechobee FL	11740na			
2200-2300 vl	Vanuatu, Radio	4960do			
2200-2210	Zambia, Natl BC Corp	6165do	6265do		
2230-2300	Albania, R Tirana Intl	7160eu	9635eu		
2230-2300	Austria, R Austria Intl	5945eu	6155eu	13730af	
2230-2256	Belgium, R Vlaanderen Intl	13670na			
2230-2300	Cuba, Radio Havana	9550am			
2230-2257	Czech Rep, R Prague Intl	7345na	9435af		
2230-2300	Hungary, Radio Budapest	3975eu			
2230-2300	Sweden, Radio	6065eu	7325eu		
2230-2300	USA, Voice of America	7215as	9770as	11760as	
		15185as	15290as	15305as	17820as
2245-2300	India, All India Radio	7410as	9705as	9950as	11620as
		13625as			
2245-2300	Vatican City, Vatican R	9600as	11830as		

## FREQUENCIES

2300-0000	Anguilla, Caribbean Beacon	6090am				2300-0000	Singapore, RCorp Singapore	6150do			
2300-0000 vl	Australia, ABC/Katherine	5025do				2300-0000 vl	Solomon Islands, SIBC	5020do			
2300-0000 vl	Australia, ABC/Tent Creek	4910do				2300-0000	Turkey, Voice of	6135eu	9655va		
2300-0000	Australia, Radio	9660pa	12080va	17580va	17795va	2300-0000	UK, BBC World Service	3915as	3955eu	5965as	5975va
		21740va						6035as	6180eu	6195eu	7110as
2300-0000	Canada, CBC N Quebec Svc	9625do						9410va	9590am	11945as	11955as
2300-0000	Canada, CFRX Toronto	6070do						11955pa	12095va	15280as	
2300-0000	Canada, CFVP Calgary	6030do				2300-0000 f	UK, Merlin Network One	3985eu	6170eu	7165eu	
2300-0000	Canada, CHNX Halifax	6130do				2300-0000	UK, Merlin Network One	3975eu			
2300-0000	Canada, CKZN St John's	6160do				2300-0000	USA, KAIJ Dallas TX	13815na			
2300-0000	Canada, CKZU Vancouver	6160do				2300-0000	USA, KTNB Salt Lk City UT	15590na			
2300-2330	Canada, Radio Canada Intl	5960na	6040na	9535am	9755na	2300-0000	USA, KWHR Naalehu HI	17510as			
		11865am				2300-0000	USA, Voice of America	7215as	9705as	9770as	11760as
2300-0000	China, China Radio Intl	5990na						15185as	15290as	15305as	17735as
2300-0000	Costa Rica, RF Peace Intl	15050va						17820as			
2300-2330	Cuba, Radio Havana	9550am				2300-0000	USA, WBCQ Monticello ME	7415na			
2300-0000	Egypt, Radio Cairo	9900am				2300-0000	USA, WEWN Birmingham AL	9385eu	13615na		
2300-2345	Germany, Deutsche Welle	6010as	9815as	13690va		2300-0000	USA, WGTG McCaysville GA	5085va	6890am		
2300-0000 s	Germany, Good News World	9405sa				2300-0000	USA, WHRA Greenbush ME	7580af			
2300-0000	Guyana, GBC/Voice of	5950do				2300-0000	USA, WHRI Noblesville IN	5745na	9495sa		
2300-0000	India, All India Radio	7410as	9705as	9950as	11620as	2300-0000	USA, WINB Red Lion PA	11950am			
		13625as				2300-0000	USA, WJCR Upton KY	7490na			
2300-2315	Italy, IRRS	3985va				2300-0000	USA, WCRN New Orleans LA	7355na			
2300-0000	Japan, Radio/NHK	15485va				2300-0000	USA, WSHB Cypress Crk SC	7510va	13770eu	15285sa	
2300-2315	Liberia, LCN/R Liberia Int	5100do				2300-2359	USA, WTJC Newport NC	9370am			
2300-0000	Malaysia, Radio	7295do				2300-0000	USA, WWCR Nashville TN	3215na	5070na	7435na	13845na
2300-2330	Mexico, Radio Mexico Intl	9705am				2300-2345	USA, WYFR Okeechobee FL	11740na			
2300-0000	Namibia, NBC	3270af	3289af			2300-0000 vl	Vanuatu, Radio	4960do			
2300-0000	New Zealand, R NZ Intl	17675va				2300-2305	Vatican City, Vatican R	9600as	11830as		
2300-2330 vl	Nigeria, Radio/Ibadan	6050do				2315-0000 vl	Libya, Voice of Africa	15235va	15415va	15435va	
2300-2330 vl	Nigeria, Radio/Kaduna	4770do				2330-0000 mtwhf	Canada, Radio Canada Intl	5960na	9755na		
2300-2330	Nigeria, Radio/Lagos	3326do				2330-0000 as	Canada, Radio Canada Intl	6040na	9535am	11865am	
2300-0000	North Korea, R Pyongyang	11335am	11710am	13760am	15130am	2330-2357	Czech Rep, R Prague Intl	7345na	9435na		
2300-0000	Palau, KHBN/Voice of Hope	9955as	9965as	9985as		2330-0000 vl	Guatemala, Radio Cultural	3300do			
2300-0000 vl	Papua New Guinea, NBC	9675do				2330-0000	Malaysia, RTM Sarawak	7160do			
2300-0000	Romania, R Romania Intl	9570eu	11810eu	11830na	15105na	2330-0000	Netherlands, Radio	6165na	9845na		
2300-0000	Sierra Leone, SLBS	3316do				2330-2357	Vietnam, Voice of	9840as	12020as		
						2345-0000	Ghana, Ghana BC Corp	3366do	4915do		

## SELECTED PROGRAMS

## Daily

- 2300 UK, BBC London (as): The World Today. See S 0000.  
2330 Netherlands, Radio: News. See S 0030.

## Monday-Friday

- 2300 USA, WEWN Birmingham AL: Catholic Answers Live. A call-in program designed to offer Catholics and non-Catholics alike an opportunity to hear from the leading apologists and theologians.  
2338 Netherlands, Radio: Newsline. See Mon-Fri 1138.  
2345 UK, BBC London (am/eu): Insight. See M 1530.

## Sundays

- 2300 UK, BBC London (am/as/eu): World News. See S 0000.  
2300 USA, WEWN Birmingham AL: Sunday Mass (encore). See S 0000.  
2305 UK, BBC London (am/eu): Outlook. See Mon-Fri 1205.  
2330 UK, BBC London (am/eu): Wright Round the World. See S 0305.  
2338 Netherlands, Radio: Wide Angle. See S 1236.  
2354 Netherlands, Radio: The Sound Fountain. See S 0054.

## Mondays

- 2300 UK, BBC London (am/as/eu): World News. See S 0000.  
2353 Netherlands, Radio: EuroQuest. See M 1253.

## Tuesdays

- 2300 UK, BBC London (am/as/eu): World News. See S 0000.  
2353 Netherlands, Radio: A Good Life. See T 1253.

## Wednesdays

- 2300 UK, BBC London (am/as/eu): World News. See S 0000.  
2353 Netherlands, Radio: Dutch Horizons. See S 1154.

## Thursdays

- 2300 UK, BBC London (am/as/eu): World News. See S 0000.  
2354 Netherlands, Radio: Research File. See M 1153.

## Fridays

- 2300 UK, BBC London (am/as/eu): World News. See S 0000.  
2330 UK, BBC London (AS): Christianity at the Crossroads (3rd, 10th, 17th, 24th). See M 1430.  
2330 UK, BBC London (as): Variable Feature. See S 0530.  
2354 Netherlands, Radio: The Weekly Documentary. See W 1153.

## Saturdays

- 2300 UK, BBC London (am/eu): Play of the Week (from 2230). See S 1130.  
2300 USA, WEWN Birmingham AL: LiveWire (encore). See F 1500.  
2330 UK, BBC London (am/eu): The Vintage Chart Show. See M 0530.  
2330 UK, BBC London (AS): Pushing Back the Curtain (4th, 11th, 13th). Historian and former World Service correspondent Misha Glenny traces the fall of Communism in eastern Europe. The final two programs focus on Czechoslovakia and Romania at the end of 1989.  
2330 UK, BBC London (as): Variable Feature. See S 0530.  
2338 Netherlands, Radio: Europe Unzipped. See S 0038.  
2354 Netherlands, Radio: Roughly Speaking. See F 1153.

HAUSER'S HIGHLIGHTS  
AUSTRIA: ORF

B-99 complete English schedule:

Start-Stop	Target	Freqs
0230-0300	ENAm	7325
0530-0600	WNAm, Eu, ME	6015C, 6155, 13730, 15410, 17870
0630-0700	WNAm	6015C
0830-0900	FE, Au	21650, 21765 Sat only
0930-1000	FE, Au	21650, 21765
1330-1400	Eu, WNAm	6155, 13730, 21650, 21765
1600-1630	WNAm	17865C [NEW]
1730-1800	Eu, Waf, ME, S/SEAs	6155, 13730, 9655, 13710
2230-2300	Eu, W/Naf	5945, 13730, 6155

(via Wolfgang Büschel, Germany)

## Santa Claus – a man of many modes!

For many years – too many for mere mortals to remember how many – Santa Claus leaves the North Pole on December 24<sup>th</sup> en route to the homes of all the little children of the world. I hear you asking: “What does propagation have to do with Christmas/Hanukkah/Winter Solstice?”

In the dark ages, before radio, Santa had to rely on beacon lights on the hills to find his way to the various area of the world, but since the advent of radio navigation, in the mid-1930's, Old St. Nick has had much better luck in finding the houses where the gifts are expected.

Over the years he has used the following radio navigation aids: the old A/N LF radio range with the associated Z markers and the cone of silence; then the advent, after WW 2, of the VOR (VHF Omnidirectional Range) made navigation easier. In the hinterland, where the installation of VOR is not possible, Santa Claus still relies on the NDBs (nondirectional beacons) for short range navigation. In Europe, for one more year, he still has DECCA installations for short range navigation; this system was also used at one time in Eastern Canada.

One major concern that Old Nick had for many years is the following: “How do you safely navigate from one continent to another?” Many systems have been available since the mid-1940s. LORAN “A”, LORAN “C”, OMEGA, ALPHA are a few that have appeared and disappeared over the years.

Now finally we have the GPS (Global Positioning System)! This new kid on the block seems to have replaced all the navigation equipment used till now by Santa Claus and it allows the user to navigate with confidence from continent to continent and from street to street with an accuracy unknown till now. So all the small children will get their gifts on time no matter where they live.

All these radio navigation systems relied on various propagation modes to make their signal useful to the user. Without the proper propagation mode, these radio aids would be useless and children would have had no present under the tree!

Let's look at the various navigation aids and see what is the reliable propagation mode present in each case. Some radio aid signals may propagate in more than one mode but not all modes can be used for safe navigation.

**ALPHA:** 10 kHz, unusual ELF mode. (Russian operated)  
**OMEGA:** 10 kHz, unusual ELF mode. No longer in operation.  
**DECCA:** 80 kHz, ground wave. No or very little sky wave present.  
**LORAN “C”:** 100 kHz, ground wave. (Extremely high

## OPTIMUM WORKING FREQUENCIES (MHz)

For the Period 15 December 1999 to 14 January 2000 Flux=201 SSN=156

Predictions prepared using ASAPS for Windows®

UTC	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
<b>TO/FROM US WEST COAST</b>																								
SOUTH AMERICA	28	25	22	18	16	13	11	11	11	11	10	9	9	*	16	26	30	31	29	29	29	29	29	30
WESTERN EUROPE	9	9	8	8	8	9	9	9	9	9	9	9	8	*	10	14	21	23	19	15	14	12	11	10
EASTERN EUROPE (P)	8	8	8	9	9	9	11	10	10	10	9	9	9	9	10	13	18	14	12	11	*	*	*	8
MEDITERRANEAN	15	14	14	13	13	13	12	12	11	*	*	*	*	*	13	19	26	27	24	21	18	17	16	15
MIDDLE EAST (P)	11	11	11	12	15	14	12	11	*	*	*	10	11	11	11	13	18	14	12	12	11	11	11	11
CENTRAL AFRICA	25	24	23	19	16	14	13	13	13	13	13	12	12	12	16	25	27	27	25	24	25	27	27	26
SOUTH ASIA	21	20	18	16	15	14	13	13	13	13	12	12	12	13	19	27	26	26	27	26	26	25	24	22
SOUTH EAST ASIA (P)	27	34	30	26	20	15	12	11	10	10	10	10	10	10	10	10	12	20	19	17	16	14	13	15
FAR EAST	31	29	26	22	18	14	11	10	9	9	8	8	8	8	9	10	10	*	*	*	14	24	31	
AUSTRALIA	26	27	27	27	23	19	16	14	13	13	13	12	12	11	11	12	18	20	20	20	23	24	25	25
<b>TO/FROM US MIDWEST</b>																								
SOUTH AMERICA	23	19	16	13	12	11	10	10	10	9	9	9	9	15	23	28	28	27	26	26	26	26	26	26
WESTERN EUROPE	11	10	10	9	9	10	10	10	11	11	11	11	11	12	14	21	27	30	27	23	19	17	14	12
EASTERN EUROPE	7	7	8	8	8	8	11	12	11	11	11	11	11	12	17	24	19	15	12	11	*	8	8	8
MEDITERRANEAN	15	15	14	13	12	12	13	12	12	12	*	*	*	*	16	23	30	30	27	24	21	19	18	16
MIDDLE EAST (P)	11	11	11	12	14	13	13	12	12	12	12	12	12	13	17	23	20	16	14	13	12	12	12	12
CENTRAL AFRICA	23	22	19	16	15	14	14	13	13	*	*	*	*	21	26	26	26	26	24	23	23	25	26	24
SOUTH AFRICA	19	18	17	15	14	14	14	14	*	*	*	*	*	22	25	24	24	24	24	24	24	23	22	20
SOUTH EAST ASIA (P)	22	25	21	17	15	*	*	*	*	*	10	10	10	10	11	16	20	17	16	15	14	12	11	13
FAR EAST	30	26	23	18	15	13	11	10	10	10	10	9	9	9	10	11	10	10	*	*	*	14	24	32
AUSTRALIA	23	24	24	22	18	14	*	12	12	12	11	11	10	10	12	19	19	17	16	17	20	22	23	23
<b>TO/FROM US EAST COAST</b>																								
SOUTH AMERICA	18	16	14	12	11	11	11	10	8	8	8	9	14	22	26	25	25	24	23	23	23	23	23	21
WESTERN EUROPE	11	10	10	9	9	9	9	9	9	11	11	11	12	17	26	31	33	31	28	24	21	18	15	12
EASTERN EUROPE	8	8	8	8	8	8	11	12	11	11	11	11	15	24	29	26	21	16	14	12	11	9	8	8
MEDITERRANEAN	17	16	14	13	11	11	13	12	12	12	*	13	21	29	31	31	31	28	25	22	21	20	18	17
MIDDLE EAST (P)	12	12	12	12	14	14	13	13	13	12	12	13	18	27	27	27	27	27	27	25	24	24	26	27
CENTRAL AFRICA	22	20	18	16	16	15	14	13	*	*	*	19	26	27	27	27	27	27	27	25	24	24	26	27
SOUTH AFRICA	19	18	17	15	14	15	14	12	*	*	*	19	26	26	25	24	24	24	24	24	24	23	22	20
SOUTH EAST ASIA (P)	17	21	19	16	15	14	*	*	*	12	12	12	13	18	25	25	20	16	15	15	14	12	11	11
FAR EAST	28	25	21	18	16	14	13	13	12	12	12	12	12	12	12	11	11	*	*	*	11	12	14	23
AUSTRALIA	23	23	19	16	*	*	*	12	12	11	11	10	11	17	22	21	18	16	16	16	19	22	22	23

\* Unfavorable conditions: Search around the last listed frequency for activity.

(P) denotes circuit across polar auroral zone; reception may be poor during ionospheric disturbances.

**A/N range:** power transmitters)  
200-500 kHz, ground wave, sky wave not to be used if present.

**NDB:** 200-500 kHz ground wave, sky wave not to be used if present. Some errors do occur at sunrise and sunset. Also if the signal crosses a coastline, an error occurs due to bending at the shoreline.

**LORAN “A”:** 1.8 MHz ground wave, skywave could marginally have been used with the proper corrections.

**Z Marker:** 75 MHz Line of sight propagation.

**VOR:** 108-118 MHz, line of sight.

**GPS:** approximately 1200 and 1500 MHz, line of sight mode, but because of the length of the path from satellites to

ground through the ionosphere, the various layers of the ionosphere do affect the signals, but not enough to really lead you astray.

So as you can see the various propagation modes affecting all parts of the spectrum are an integral component of the air navigation system used by Santa Claus.

Happy Hanukkah, Happy Winter Solstice and Merry Christmas to all the readers. The DX season is still young and the sunspot and 10 cm flux numbers are still going up; 2000 should be an excellent year for DXing. Happy New Year!

# Charting a Future for International Radio Broadcasting - I

**Y**ou might've heard something about a millennium? At least according to the Gregorian calendar, we're about to end one century and start another. It's all quite subjective and, therefore, good for little more than an excuse to party and as a common reference point. But it is customary to use such endings and beginnings to reflect on what has been and consider what ought to be. So we will apply this exercise – this month and next – to international radio.

It would not be putting too fine a point on things to say that international radio broadcasting has been adrift over the last decade. As long as there was a Cold War to fall back on, stations had little to worry about in the way of defining their missions and securing their budgets.

But the world has changed mightily since the Berlin Wall came down, and this has posed an increasing, and often bewildering, series of challenges. In order to survive and begin to prosper in this new environment, here is one observer's opinion on what needs to happen:

1. *The international radio community must see itself as an identifiable industry with a valuable product, instead of as a set of individual competing stations and services.*
2. *With this redefined self-image, the international radio community must emphasize joint action to promote its industry and protect its assets.*
3. *The international radio community must raise the visibility of its industry and effectively articulate its value in a post-Cold War world.*
4. *The international radio community must jointly support and develop its core assets.*
5. *The international radio community must plan coordinately for the future of its industry.*

This month, we'll discuss the first two points that set the rationale, leaving the remaining points flowing from that rationale for January.

## **1 International radio needs to embrace a new self-image.**

International radio broadcasters need to transform their perception of themselves. They must see themselves as an industry with a unique product, rather than simply as individual broadcasters competing with each other and with other media, as they do now. This change won't come easily, if it comes at all.

Historically, there have been some tentative steps toward low-level or tightly focused cooperation. The so-called *Group of Six* was a loose association formed by similar-sized international broadcasters – such as **Radio Canada International (RCI)**, **Radio Sweden** and **Swiss Radio International (SRI)** – that has been used primarily for promotional purposes.

*Radio E* is a consortium of European international broadcasters whose primary efforts to date have centered around joint programming projects.

*WRN* (the World Radio Network), while not per se a cooperative arrangement of broadcasters, has served as an amalgamator of international radio programming for rebroadcast by local domestic stations and via satellite and the Internet.

For decades, there also have been a range of regional international associations – such as the *European Broadcasting Union (EBU)* and the *Asia Pacific Broadcasting Union (ABU)*, among others – whose stated aims include closer cooperation. All of these, though, can be characterized as rather weak attempts hamstrung by an air of provincial protectionism as opposed to a determination to take more aggressive, concerted action.

The cable television industry is a good example of how a media industry can flourish in a rabidly competitive, multimedia world. This model can serve, in some important ways, as a useful paradigm for international radio. Like international radio, cable offers diverse programming with some services carving out a unique niche for themselves and some zealously competing with one another. However, cable consistently projects itself to competitors and customers as a distinct industry with a definitive product, with attributes that set it apart from and above other media. A similar international radio “community” must emerge and be willing to do the same.

One more recently formed group, the *Association for International Broadcasting (AIB)*, appears to want to be the catalyst to do just that. However, its acceptance by broadcasters has been slow at best and the thrust of the organization to date has been somewhat inconsistent. Consequently, the results thus far have been far less than what was hoped for. This is not a promising sign.

Simply put, without this internal change in perception, international radio broadcasting will continue to decline and the decline will become increasingly precipitous.

## **2 A cooperative and coordinated effort is a vital necessity.**

Armed with this new perception of themselves as a separate industry with a unique and valuable product, international radio broadcasters must then take joint action to promote their industry and protect their assets. Given the small size and budgets of most broadcasters and the threat they are all under, the necessity for this approach should be easy to see.

However, it may also appear at first glance that larger broadcasters like the **BBC** and **VOA** would have less use for such cooperation and, therefore, the temptation for them would be to go it alone. But almost all international radio broadcasting is **public service** broadcasting funded by **public** (as opposed to commercial) **sources**. In today's world – one enamored with the commercially supported private sector and vocally hostile toward the public sector – this single factor should be seen by the broadcasters themselves, large and small, as both a shared threat and a shared challenge. In essence, this element serves as no less than their linchpin to survival as an industry because there is no evidence that international broadcasting can exist successfully as a commercial entity.

A few currently more healthy and better positioned broadcasters may be able to survive longer than others relying only on their own efforts. But there is clearly more safety in numbers. If the number of international broadcasters were to continue to decline, those remaining would become increasingly vulnerable. With so much at stake, it would not appear to be a risk worth taking.

More on this next month.

## **■ Music on Shortwave Redux**

Thanks to Charles Broyles of Pittsboro, NC, who forwarded a music listening suggestion via e-mail: **Radio Cultura**, Sao Paulo, Brazil, on 17815 kHz, beginning around sunset and continuing to about 0100 UTC. He says that Radio Cultura's music selection is in a class by itself. **Radio Cultura** also broadcasts on 6170 and 9615 kHz.

Happy New Year! See you in January.



## Aiming Your HF Antenna

By Douglas A. Blakeslee, N1RM

As the twenty-third recorded sunspot cycle reaches its peak, long distance monitoring on the 15- through 50-MHz bands will be better than has been experienced for many years. It may also be the first time for many to try a directional antenna on high frequency (HF) bands.

For the purposes of this article, we will describe any rotatable antenna as a "beam," i.e., an antenna that has a radiation pattern concentrated in a desired direction. The beam can be anything from a rotatable dipole to a huge array of Yagi antennas. Light-weight beams can be rotated by hand or by a TV-quality rotator. Smaller beams can also be installed in suburban areas without incurring the wrath of neighbors.

### ■ Which Way Do I Point This Thing?

Once you have a beam, the first question is always, "where do I point the antenna for Australia or some other point of interest?" The answer isn't always as easy as one would think. The world is round, not flat as shown on many maps. We need to look at the world as a sphere and to view our location on the globe as a launch point for our antenna's radiation pattern to other areas that we want to monitor. Most simple rotators are calibrated in direction (north, east, etc.), not to a geographical position on the globe.



*This direction indicator is a world map mounted on a piece of display board. Construction details are in the text.*

One simple solution used by this author is to copy the world chart in *The ARRL Operating Manual*<sup>1</sup> for my area and then to enlarge it at a local quick copy center. A full chart was cemented on a piece of mounting board, 7 by 7 inches. An L-shaped piece of aluminum stock was used as a base. Two 3M adhesive feet, available at most hardware stores, are used at the front of the L bracket, providing stability and a slightly backward tilt to the display.

To provide an indicator, a push pin was fitted with a 7-inch-long piece of no. 22 wire. The center of the wire is wrapped around the push pin and then soldered in place. To provide better contrast versus the background map, the wire was painted with bright red nail polish borrowed from the author's wife. (We can't claim that she had any understanding about why nail color was needed for a radio project.)

With this simple setup, one can rotate the push pin, turning the wire indicator. The result is a readout in degrees showing where to rotate your beam. Some might argue that this is not a very exact positioning system, but most beam antennas have radiation patterns that are in the range of 20 to 40 degrees in the horizontal plane. So accuracy to a few degrees is not necessary for this application.

### ■ The Rotator

The expensive rotators built for large antennas are generally calibrated in degrees. Simple rotators, such as the RS 15-1225, are not. To provide a degree calibration for the Radio Shack rotator, another enlarged print was cut out and fastened to the rotator dial with rubber cement.

In this way, the direction shown on our little chart can be translated into antenna directions following the readout now placed on the rotator. Of course, you need to assure before starting that your rotator and antenna are calibrated to face in a given direction, usually true north. The instructions for finding north are given in *The ARRL Operating Manual*.<sup>2</sup>

### ■ The Wild Ionosphere

Dr. Oswald Villard, W6QYT, is a profes-



*The same map used on the indicator board was cut out to retain only the circular bearing chart. This piece was cemented to the top of this Radio Shack rotator control box.*

sor emeritus at Stanford University. Years ago he gave a wonderful talk to amateur groups called "Stalking the Wild Ionosphere." His major point was that every hour, every day, every month, propagation conditions change on the high frequency (HF) bands. This is one of the thrills of radio listening; no two days are ever alike.

Villard picked up the moniker "Mike" as a teenager because of his interest in ham radio. His contributions to radio are legend, starting with his work just after World War II in starting single sideband as a ham transmission mode. For his work related to national defense, he has been given the highest award that this nation provides to a civilian.

What Villard made clear for all was that ionospheric propagation could and does distort transmission paths. This has significance, because the best path to a distant point may *not* be a straight line. Under normal conditions, what is called the "great circle route" is the shortest path from your location to the desired station. You can take a piece of string and put one end at your location and the other at the transmission point to see visually the short path.

However, the signal can travel the other way around the world, called the "long path." Here you take the string and route it around the world the other, longer, way. Usually, the two paths aren't operative at the same time. But sometimes they are, resulting in around the world propagation which can produce some interesting echo effects because the two sig-

nals arrive at slightly different times. (Radio waves travel at close to the speed of light, but when traveling around the world it does take microseconds.)

Also, that wild and wooly ionosphere can play some tricks with signals arriving from odd angles. The only lesson here is that a beam antenna should be equipped with a rotator where possible, so that the arriving signal can be optimized.

Generally, the short path to the desired

station is what will normally work best. With a broad beamed antenna, such as a linear loaded quad or dipole, the antenna only needs to aimed generally in the correct direction. But, never underestimate the tricks of the ionosphere. The ability to null out interference by turning the antenna can aid reception.

The choice of antenna siting and effective power reception is beyond the scope of this article. For those of us who live on small city lots with smaller beam antennas, we can only

dream of having such problems. For those with appropriate real estate and antenna budgets, *The ARRL Antenna Handbook* has the details.<sup>3</sup>

## ■ Footnotes

- 1- Halprin, *The ARRL Operating Manual*, ARRL, 1987, pg. 4-3.
- 2- Ibid., pages 4-1 to 4-3
- 3- Straw, *The ARRL Antenna Book*, ARRL, 1997, pgs. 3-13 to 3-31.

# SATELLITE RADIO GUIDE

MT

## INTERNATIONAL SHORTWAVE BROADCASTERS (via satellite)

By Larry Van Horn, MT Assistant Editor

### WRN One English to North America

Galaxy 5, 125 degrees West, transponder 6 (TBS) 3.820 GHz, V-Pol, audio subcarrier 6.80 MHz. WRN program details can be heard at 0625, 1525 and 1955 Eastern. Program information is also available on TBS Text page 204. You can reach WRN by email at [online@wrn.org](mailto:online@wrn.org) or through their website on the internet at <http://www.wrn.org>. Many programs can also be heard in Canada on *CBC English Overnight*. WRN is relayed 24 hours a day on many cable systems via the CSPAN Audio One Network. All times are U.S. Eastern Time and all programs in English.

ET	Station
0000	Radio Telefis Eireann (RTE) – Dublin, Ireland (Irish Collection)
0100	Swiss Radio International – Berne, Switzerland
0130	Monday-Friday: Channel Africa – Auckland Park, South Africa Saturday: <i>The Way Ahead and New Horizons</i> Sunday: Glenn Hauser's <i>World of Radio</i>
0200	to be announced
0230	Radio Vlaanderen International – Brussels, Belgium (Brussels Calling)
0300	Radio Australia – Melbourne, Australia
0400	Voice of Russia – Moscow, Russia
0430	Radio Canada International – Montreal, Canada (Monday-Friday) Saturday: <i>Network Plus</i> and <i>New Horizons</i> Sunday: United Nations Radio: <i>World in Review and Scope</i>
0500	Radio Prague – Prague, Czech Republic
0530	Radio Vlaanderen International – Brussels, Belgium (Brussels Calling)
0600	Swiss Radio International – Berne, Switzerland
0630	YLE Radio Finland – Helsinki, Finland
0700	Radio Australia – Melbourne, Australia
0800	Radio Telefis Eireann (RTE) – Dublin, Ireland
0900	Radio Prague – Prague, Czech Republic
0930	Radio Sweden – Stockholm, Sweden
1000	Monday-Saturday: Channel Africa – Auckland Park, South Africa Sunday: Voice of America <i>Communications World</i> – Washington, DC USA
1030	Radio Vlaanderen International – Brussels, Belgium (Brussels Calling)
1100	Radio France International – Paris, France
1200	Monday-Friday: <i>Caribbean Tempo</i> from CANA Radio Saturday: Glenn Hauser's <i>World of Radio</i> Sunday: <i>2000 News Athens</i> and <i>Money Matters</i>

1215	Monday-Friday: Vatican Radio – Vatican City (World News)
1230	Radio Austria International – Vienna, Austria
1300	Monday-Friday: Radio Slovakia International – Bratislava, Slovakia Saturday: Radio New Zealand International – Wellington, New Zealand Sunday: Radio Denmark – Copenhagen, Denmark (Copenhagen Calling)
1330	Radio Telefis Eireann (RTE) – Dublin, Ireland
1400	Radio Australia – Melbourne, Australia
1430	Radio Vlaanderen International – Brussels, Belgium (Brussels Calling)
1500	YLE Radio Finland
1530	Radio Sweden – Stockholm, Sweden
1600	Swiss Radio International – Berne, Switzerland
1630	Polish Radio – Warsaw, Poland
1700	Radio Telefis Eireann (RTE) – Dublin, Ireland
1900	Kol Israel – Jerusalem, Israel
1930	Swiss Radio International – Berne, Switzerland
2000	to be announced
2030	Monday-Friday: Radio Slovakia International – Bratislava, Slovakia Saturday: United Nations Radio: <i>World in Review and Scope</i> Sunday: <i>Network Plus</i> and <i>The Way Ahead</i>
2100	YLE Radio Finland – Helsinki, Finland
2130	Radio Sweden – Stockholm, Sweden
2200	Radio Prague – Prague, Czech Republic
2230	Radio Austria International – Vienna, Austria
2300	Polish Radio – Warsaw, Poland
2330	Radio Budapest – Budapest, Hungary

### WRN Two Multi-Lingual to North America

Galaxy 5, 125 degrees West, transponder 6 (TBS) 3.820 GHz, V-Polarization, Audio subcarrier 6.2 MHz. Note that some programs listed below are subject to pre-emption without notice. All times are U.S. Eastern Time.

ET	Station
0000	World Radio Network from National Public Radio
0600	YLE Radio Finland – Helsinki, Finland (News in Finnish). On Saturdays a phone-in for children in Finnish until 0630.
0610	YLE Radio Finland – Helsinki, Finland (Easy listening music with announcements in Finnish and English)



## SW BROADCASTERS VIA SATELLITE, cont'd

0630	YLE Radio Finland – Helsinki, Finland (News of the past 24 hours in Finnish)
0700	Interval signal
0800	Raidio na Gaeltachta (News in Irish)
0900	Radio Prague – Prague, Czech Republic (Programming in Czech)
0927	Interval signal
1000	YLE Radio Finland – Helsinki, Finland (Regional broadcasts from various parts of Finland in Finnish)
1030	YLE Radio Finland – Helsinki, Finland (News in Finnish)
1100	YLE Radio Finland – Helsinki, Finland (Variable programming in Finnish– often light music)
1200	Radio Prague – Prague, Czech Republic (Programming in Spanish)
1300	Voice of Russia – Moscow, Russia (Russian Programming)
1400	Radio Vlaanderen International – Brussels, Belgium (Brussels Calling with Dutch programming)
1430	Identification tone
1630	Radio Austria International – Vienna, Austria (German Programming)
1700	Radio Budapest – Budapest, Hungary (Hungarian Programming)
1800	Polish Radio – Warsaw, Poland (Polish programming)
1830	YLE Radio Finland – Helsinki, Finland (Devotional programming in Finnish)
1855	YLE Radio Finland – Helsinki, Finland (News in Finnish)
1900	YLE Radio Finland – Helsinki, Finland (News of the past 24 hours in Finnish)
1925	YLE Radio Finland – Helsinki, Finland (News in Swedish)
1930	YLE Radio Finland – Helsinki, Finland (French programming)
1945	YLE Radio Finland – Helsinki, Finland (Light music in Finnish)
2030	YLE Radio Finland – Helsinki, Finland (Easy listening music). Announce- ments partially in English. Saturdays a phone-in for children in Finnish
2100	YLE Radio Finland – Helsinki, Finland (Documentaries and Theater of the Air in Finnish). Sunday: Classical music with a preview in English.
2200	YLE Radio Finland – Helsinki, Finland (English programming)
2230	Identification tone Friday: Voice of America <i>Communica- tions World</i> – Washington, DC USA
2300	Interval signal
2330	Radio Austria International – Vienna, Austria (German programming)

### WRN One English to Europe

Astra 1B, 19 degrees East, transponder 22 (VH-1) 11.538 GHz, V-Polarization, audio subcarrier 7.38 MHz. All programs in English and WRN program information can be heard daily at 0125 and 2025 UTC. Program information is also available on VH-1 Text page 222, 223, 224.

## Single Channel Per Carrier (SCPC) Services

By Robert Smathers  
roberts@nmia.com

An SCPC transmitted signal is transmitted with its own carrier, thus eliminating the need for a video carrier to be present. Dozens of SCPC signals can be transmitted on a single transponder. In addition to a standard TVRO satellite system, an additional receiver is required to receive SCPC signals.

The frequency in the first column is the 1st IF (typical LNB frequency) and the second column frequency (in parentheses) is the 2nd IF (commercial receiver readout) for the SCPC listing. Both frequencies are in MHz.

### GE-2 Transponder-Vertical 13 (C-band)

1179.40 (80.6)	NASA space shuttle audio
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### GE-3 Transponder-Horizontal 13 (C-band)

1201.50 (58.5)	Wisconsin Voice of Christian Youth (VCY) America Radio Network–religious programming
1201.30 (58.7)	Wisconsin Voice of Christian Youth (VCY) America Radio Network–religious programming

### Galaxy 6 Transponder 1-Horizontal (C-band)

1443.80 (56.2)	Voice of Free China (International Shortwave Broadcaster) Taipei, Taiwan
1443.60 (56.4)	KBLA-AM (1580) Santa Monica, CA–Radio Korea
1443.40 (56.6)	Voice of Free China (International Shortwave Broadcaster) Taipei, Taiwan
1438.30 (61.7)	WWRV-AM (1330) New York, NY–Spanish religious programming and music, ID–Radio Vision Christiana de Internacional

### Galaxy 6 Transponder 3-Horizontal (C-band)

1404.80 (55.2)	KOA-AM (850)/KTLK-AM (760) Denver, Colo–news and talk radio/Broncos NFL radio network/Colorado college sports
1404.60 (55.4)	WGN-AM (720) Chicago, IL–news and talk radio/Northwestern college sports/Bears NFL radio network
1404.40 (55.6)	Illinois News Network/W MVP-AM (1000) Chicago, IL–ESPN Radio 1000
1404.20 (55.8)	Tribune Radio Networks/Wisconsin Radio Network
1402.90 (57.1)	USA Radio Network
1402.70 (57.3)	WLAC-AM (1510) Nashville, TN–news and talk/Road Gang trucker

1402.20 (57.8)

1402.00 (58.0)

1401.80 (58.2)

1401.50 (58.5)

1399.00 (61.0)

1398.80 (61.2)

1398.50 (61.5)

1398.30 (61.7)

1397.80 (62.2)

1397.50 (62.5)

1397.10 (62.9)

1396.90 (63.1)

1396.70 (63.3)

1396.40 (63.4)

1395.80 (64.2)

1395.60 (64.4)

1395.40 (64.6)

1395.00 (65.0)

1394.70 (65.3)

1394.30 (65.7)

1385.40 (74.6)

1385.00 (75.0)

1384.60 (75.4)

1384.40 (75.6)

program (overnight)/Tennessee college sports

NorthWest Ag News Network - Agriculture info for the Pacific Northwest

Occasional audio

For the People Radio Network with Chuck Harder – talk radio format

Agrinet Ag info/USA Radio Network

Sports Byline USA/Sports Byline Weekend

Talk Radio Network (TRN) – talk radio format

Occasional audio

WSB-AM (750) Atlanta, GA– news/talk

Occasional audio

Minnesota Talking Book Radio Network–reading service for the blind

Wisconsin Radio Network/Wisconsin college sports

Dallas Cowboys Spanish Radio Network

Radio America Network/Business News Network

Georgia News Network (GNN)–network news feeds

WTMJ-AM (620) Milwaukee, WI–talk radio/Packers NFL radio network

WGST-AM/FM (640/105.7) Atlanta, GA ID *Planet Radio*–news and talk radio/Falcons NFL radio network

Michigan News Network–network news feeds/WPLT-FM (96.3)

Detroit, /Michigan college sports

Occasional audio

WJR-AM (760) Detroit, MI–news and talk radio/Michigan News Network

Michigan News Network – network news feeds/Michigan State college sports

WDUQ-FM (90.5) Pittsburgh, PA – Jazz format

Indy Racing Radio Network (occasional audio)

WDUQ-FM (90.5) Pittsburgh, PA – Jazz format

KOA-AM (850)/KTLK-AM (760) Denver, CO–news and talk radio/Broncos NFL radio network/

Colorado college sports

# SATELLITE RADIO GUIDE



## SINGLE CHANNEL PER CARRIER (SCPC) SERVICES

1384.20 (75.8)	WSB-AM (750) Atlanta, GA – news/talk
1383.10 (76.9)	KIRO-AM (710) Seattle, WA—news and talk radio/Seahawks NFL radio network
1382.60 (77.4)	Soldiers Radio Satellite (SRS) network—U.S. Army information and entertainment radio/Army college sports
1382.30 (77.7)	Motor Racing Network (occasional audio) NASCAR racing
1382.00 (78.0)	Occasional audio
1381.60 (78.4)	KEX-AM (1190) Portland, OR—news and talk radio
1381.40 (78.6)	Occasional audio/Westwood One radio sports
1381.20 (78.8)	KJR-AM (950) Seattle, WA— sports talk radio/Washington State college sports
1377.10 (82.9)	In-Touch—reading service
1376.00 (84.0)	Kansas Audio Reader Network—reading service

### Galaxy 6 Transponder 6-Vertical (C-band)

1347.00 (53.0)	WCRP-FM (88.1) Guayama, PR—Spanish language religious programming
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### Anik E2 Transponder 1-Horizontal (C-band)

1446.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio-North (Quebec) service
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### Anik E2 Transponder 5-Horizontal (C-band)

1366.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio-North (Eastern Arctic) service
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### Anik E2 Transponder 7-Horizontal (C-band)

1326.00 (66.0)	Canadian Broadcasting Corporation (CBC) Radio-North (MacKenzie) service
1325.50 (65.5)	Canadian Broadcasting Corporation (CBC) Radio—Occasional feeds/events

### Anik E2 Transponder 17-Horizontal (C-band)

1126.00 (54.0)	Canadian Broadcasting Corporation (CBC) Radio-North (Western Arctic) service
1125.50 (54.5)	Canadian Broadcasting Corporation (CBC) Radio-North (Newfoundland and Labrador) service

### Anik E2 Transponder 23-Horizontal (C-band)

1006.00 (54.0)	Societe Radio-Canada (SRC) Radio-AM Network
1005.50 (54.5)	Canadian Broadcasting Corporation (CBC) Radio-North (Yukon) service

### Solidaridad 1 Transponder 1-Vertical (C-band)

1447.90 (52.1)	Antenna Radio Noticias
1447.60 (52.4)	Antenna Radio Noticias
1447.20 (52.8)	La Grande Cadena Raza

### Anik E1 Transponder 21-Horizontal (C-band)

1036.70 (63.3)	In-store music
1037.00 (63.0)	In-store music
1037.50 (62.5)	In-store music

### SBS5 Transponder 2-Horizontal (Ku-band)

1013.60 (80.4)	Wal-Mart in-store network
1013.20 (80.8)	Wal-Mart in-store network
1012.80 (81.2)	Sam's Wholesale Club in-store network
1004.50 (89.5)	Wal-Mart in-store network
1004.00 (90.0)	Wal-Mart in-store network
1003.60 (90.4)	Sam's Wholesale Club in-store network
1003.20 (90.8)	Wal-Mart in-store network

### RCA C5 Transponder 3-Vertical (C-band)

1404.60 (55.4)	Wyoming News Network—network news feeds
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1400.60 (59.4)	Learfield Communications/Stam Solomon Talk Show (occ)/Indiana college sports
1400.40 (59.6)	Learfield Communications/MissouriNet/Rams NFL radio network
1400.20 (59.8)	Learfield Communications
1400.00 (60.0)	Learfield Communications/Stam Solomon Talk Show (occ)/Purdue college sports
1396.60 (63.4)	Kansas Information Network/Kansas Agnet—network news feeds
1396.40 (63.6)	Liberty Works Radio Network – talk radio
1396.20 (63.8)	MissouriNet
1396.10 (63.9)	MissouriNet
1395.90 (64.1)	Western Montana Radio Network/Red River Farm Network
1395.70 (64.3)	MissouriNet
1386.40 (73.6)	Learfield Communications/Chiefs NFL radio network
1386.20 (73.8)	Radio Iowa/Iowa college sports
1384.60 (75.4)	Capitol Radio Network
1384.00 (76.0)	Capitol Radio Network
1383.80 (76.2)	Learfield Communications
1383.40 (76.6)	Capitol Radio Network
1382.90 (77.1)	MissouriNet
1382.50 (77.5)	Virginia News Network—network news feeds/
1382.10 (77.9)	Learfield Communications/MissouriNet

**INTRODUCING**

**DIRECT FREQUENCY READOUT  
SCPC AUDIO RECEIVER**

**FULL COMMERCIAL FEATURES**

**UNIVERSAL SCPC-200 AUDIO RECEIVER**

- EASY DIRECT FREQUENCY TUNING - 50 TO 90 MHz (LCD)
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# DBS Update: The Latest on Small Dish TV

1994 was both a beginning and an end in the satellite TV industry. It was the beginning for the small dish satellite TV revolution and it was the end of the expansion of the big dish satellite industry. At that time there were over 3 million big dish subscribers, the only game in town, and certainly a million more non-subscribers who don't count in the overall dish census because they're not paying to watch the encrypted channels. They're using their systems to watch all the "in the clear" programming.

Halfway into 1994, DirecTV launched its service and within months there were five competitors, AlphaStar, DirecTV, DISH Network, PrimeStar, and USSB, all vying for the tens of millions of potential customers. Five years later there are only two small dish companies left. AlphaStar went belly-up just short of its first anniversary; DirecTV merged with USSB, a business arrangement which seemed obvious from the outset; and this year DirecTV bought out PrimeStar. DirecTV (with 7.3 million customers) is in a battle to the finish with DISH Network (with only 2.6 million customers) to see who can win the ultimate prize in capitalism, a genuine monopoly!

Both services have determined that the way to do this is through cut-throat competition and low-ball pricing: give the systems away if you have to, just get those subscribers signed up! To that end we are treated to all manner of hook-baiting such as the \$79 complete system pricing including shipping, handling and installation kit.

But, you'd better read the fine print before reaching for your plastic. DISH Network has a bounty out for any dealer who can sign up the last of the existing PrimeStar subscribers. And, some dealers are even giving away systems to any existing C-band viewer who will junk his or her big dish system for their little dish.

And why not? The name of this game is annual subscription renewals and even the most basic subscription costs \$240 per year. Adding up the 11.6 million total satellite subscribers (including big dish viewers) and multiplying that number by an average \$30 per month gives one an appreciation as to the stakes in this game: \$348 million per month in income! An annual \$4.1 billion dollar TV habit.

### ■ The Hardware

The two remaining services have different approaches in the sales of system hardware. DISH systems are made only by Echostar which owns DISH and the Echostar satellites on which their programming is transmitted. There are only four models which are available and then only through authorized dealers. DISH relies primarily on the old network of C-band big dish satellite retailers to make the sales and do the installations in a deliberate effort to enlist these dealers as natural allies.

DirecTV is interested in no such alle-

giances. Initially only RCA was authorized to make and distribute DirecTV systems, but, after the first year others were licensed and the race was on. Every major brand name manufacturer in the world was after what was to be the electronic sales phenomenon of the decade. Five years later that number is down to a handful of familiar companies doing most of their sales through big chain discount electronic retailers such as Circuit City, Best Buy, Radio Shack, etc.

Among the manufacturers still in the game are Hughes Network Systems, RCA, Sony, and Uniden. Prices on systems vary with the retailer, but in general, RCA systems are discounted the most and Sony systems seem to be the most expensive.

On both DISH and DirecTV systems, all components are similar. The dishes are 18", the receivers nearly identical physically, and the features are much the same. Both basic systems have an on-screen and audio dish alignment feature; an interactive program guide with on-screen menus and pay-per-view ordering; parental lock-out; and direct event timers to activate your VCR.

Price differences for individual systems depends on the features desired by the consumer. For instance, a dual LNBF (which makes it possible to run two independently operated receivers off the same dish); IR/UHF dual remote control (which allows remote control to be operated either by Infra Red or UHF); and StarSight on-screen guide (which allows "one button record" of movies) are all items left off the low-ball adver-





tised system price but are features many consumers will want once they start using the service.

Again, look to the fine print of the deal you're signing on to. Some systems advertised as \$79.99 are good only for new subscribers, up-grading as a current subscriber the same system will cost \$199.95. Some systems will sell for up to \$500 less installation. Pay attention to the details of each system and try to ask yourself what you think you'll really need.

## ■ The Programming

Both DISH and DirecTV offer programming packages designed to offer just enough features to look good, but reserve the top program channels for up-grades. For example, DISH's "Top 40" package offers a total of 43 channels for \$20. DirecTV's "Select Choice" offers 42 channels for the same price. Add-ons and up-grades can quickly escalate your TV tab to over \$100 a month if you want DirecTV's "Total Choice Platinum" (\$81 plus any pay-per-view movies or events) or DISH's America's Top 100 and Movie Package (\$64 plus regional sports, Superstations, NASA Channel, Bloomberg, pay-per-view, etc.).

Of the two, DISH has the distinct programming edge. Their extensive list of international services including Spanish and Arabic language programming packages as well as numerous single channel specialty services for Greek, French, Portuguese, Italian, Japanese, Polish, and Hindi viewers aren't touched by DirecTV. But, that's not all. DISH is prepared to offer all the main "over-the-air" channels from the top 12 markets in the U.S. exclusively to viewers in those markets,

thus answering the cable challenge of offering local service. While DirecTV claims it will also provide such a service, only DISH actually has all 58 channels up and ready for service should Congress approve the necessary legislation to make it possible. Of course, these channels will not be free and you can expect to be billed for their addition.

As with the hardware, read the details of each program package and take a look at the channels offered. Unlike the big dish packages, small dish systems don't allow *a la carte* subscriptions, i.e. paying only for those channels you want to see.

## ■ Upsides and Downsides

The small dish satellite TV system was a real blessing for all those people living in townhouses, suburban developments, exclusive gated communities with their restrictive covenants and even rural homeowners who had no inclination to get involved with complicated big dish systems. They do have their limitations.

Neither of the two existing services are compatible; you can't just switch from DirecTV to DISH without buying a whole new system. Despite the "introductory offers," these systems are not cheap and maintaining an annual subscription may prove far more expensive than traditional cable or big dish satellite TV. Monthly fees for the last 5 years have risen steadily and, like their cable counterparts, will continue to do so.

As with cable, small dish services confuse heaping on additional unwanted channels (and subsequently jacking up the subscription fee) with offering real viewing value to their customers. Who really needs 5 channels of HBO? Taking advantage of the dual

LNBF option will be one more thing added to your monthly bill.

## ■ How to Order

As mentioned, DISH Network and DirecTV systems are widely available throughout the U.S. and signing up for programming packages can be done with the dealer from whom you purchase your system. However, it pays to shop around. While programming package prices are identical from dealer to dealer, hardware prices may vary widely. Check first with your local dealer and make notes on the system model and features.

If you have access to the Internet, Table 1 shows web sites that will be helpful in doing your consumer research.



**TABLE 1**

Hughes Network Systems	<a href="http://www.directv-systems.com/prodinfo/model_compare.htm">www.directv-systems.com/prodinfo/model_compare.htm</a>
RCA DSS systems	<a href="http://www.nipper.com/products/models.asp...media&amp;Type=Satellite&amp;SubType=NOSUB">www.nipper.com/products/models.asp...media&amp;Type=Satellite&amp;SubType=NOSUB</a>
Sony DSS systems	<a href="http://www.sel.sony.com">www.sel.sony.com</a>
Uniden products	<a href="http://www.uniden.com/docs/products/prdetail.cfm?product=UDS200">www.uniden.com/docs/products/prdetail.cfm?product=UDS200</a>
DISH Network system	<a href="http://www.dishnetwork.com/systems/receivers/model_compare.htm">www.dishnetwork.com/systems/receivers/model_compare.htm</a>
Channel line-up comparisons	<a href="http://www.dishnetwork.com/programming/quick.htm">www.dishnetwork.com/programming/quick.htm</a> and <a href="http://www.directv.com/overview">www.directv.com/overview</a>
On-line retailers	<a href="http://www.needadish.com/products/main">www.needadish.com/products/main</a> <a href="http://www.roxy.com">www.roxy.com</a>

These retailers are only a few of the ones you may find on the Web and can be used to compare prices on the same products offered by your local dealer. Local dealers want your business because they will receive residual commissions on your subsequent subscriptions. So, if their prices are higher than those found on the Web, show them the facts and they might match it.

## Are We Alone?

That question has haunted humankind since first we realized that the points of light in the night sky are other suns. Today we have the technology to seek a definitive answer! *The SETI League* is participatory science. We are the international grass-roots organization dedicated to privatizing the Search for Extra-Terrestrial Intelligence. Together, hundreds of members in dozens of countries are keeping alive the quest for our cosmic companions. Learn how you can join this team of ordinary citizens in completing the research which Congress wouldn't let NASA finish.



### The SETI League, Inc.

433 Liberty Street, PO Box 555

Little Ferry NJ 07643 USA

Phone (201) 641-1770

Fax (201) 641-1771

Web <http://www.setileague.org/>

email [join@setileague.org](mailto:join@setileague.org)

a membership-supported, nonprofit [501(c)(3)]  
educational and scientific organization

*Searching for Extra-Terrestrial Intelligence*

## Keep On Having Fun!

This being my last column for *Monitoring Times* in the 20th century, I want to take the opportunity to thank Grove Enterprises for allowing me this forum since 1988. And of course I want to thank all my readers. I hope my ramblings have been of some help to you as you move forward in the greatest hobby in the world. As we pass this milestone, let me share a few thoughts that I hope you will carry with you in your monitoring.

Each new radio season brings the hope of logging a number of stations that have eluded me through the years. No doubt, over the last few years I have not spent as many late nights hunched over the dials as I once did. Admitting this in a national magazine will no doubt cause my effigy to be burned at several DXer gatherings. The assembled self-proclaimed DXperts will say "How dare Uncle Skip say such things to beginners? Beginners should be taught to sacrifice to become great DXers like us!" and further call for my head on a spit. My advice to these folks is simple...

**RELAX!**  
**THIS IS A HOBBY.**  
**IT'S SUPPOSED TO BE FUN!**

A lot of beginners write me after they have been involved in the hobby for about a year and tell me that they are already getting "burnt out." The endless stream of technology and information that our hobby presents tends to frighten more than a few beginners away. These folk's fears are not helped in the least by a small but prominent group of DXperts that populate many radio hobby publications and gatherings, putting forth the notion that you can only "enjoy" the radio hobby if you have several thousand dollars worth of equipment and devote countless hours to study. I know one guy who has worked his way through three wives in pursuit of DXellence. I'm not sure a hobby is worth such a cost. But then again, I've never played golf.

A hobby is supposed to be something that takes a person away from the stresses of the "real" world of work and responsibility. A hobby is something you do for a few hours each week to rest, relax and recreate. However, many hobbies, radio included, can involve the hobbyist to the point that they become as intense as all those things he or she

*Uncle Skip shows that his love for the radio hobby is at least Skin Deep!*



took up the hobby to get away from. Beginners are especially susceptible to this trap. So Old Uncle Skip's holiday gift to each and every one of you is a list of tips to avoid turning the radio hobby into another one of life's pressure cookers.

**YOU CAN LISTEN TO ANYTHING**  
**YOU WANT TO.**  
**YOU JUST CAN'T LISTEN TO**  
**EVERYTHING YOU WANT TO.**  
**AT LEAST NOT IN THIS LIFETIME.**

When you realize that the monitoring hobby includes the possibility of tuning in to thousands of frequencies in order to listen to communications from hundreds of countries in any one of a dozen or so modes, it's a wonder that we can listen to anything at all. To get any enjoyment you will have to narrow your focus a bit.

I call this the stamp collector's system. Few stamp collectors spend their time blindly filling books with the thousands of stamps that the world has to offer. Doing so would not be a pleasurable experience. Instead, it would be more akin to drudgery. Most stamp collectors settle in on a few areas of personal interest. It may be stamps of a certain group of countries, stamps from a particular era, or stamps that all share a particular design (for example, radios).

Beginning radio monitors will first want to dial around to get a notion of all the wonderful signals there are to listen to. But continued happiness will be found, for most folks, by settling in on areas of listening

interest. This is why *MT* has so many columns on the different aspects of radio monitoring. You may enjoy shortwave broadcasts but not be particularly interested in utility monitoring. You may like to listen in on aircraft but not have much desire to follow the other things you can hear on your scanner.

And of course there are no rules to say that you can't change your mind down the log. It ain't nobody's business but your own, Compadre! Radio monitoring is a vast smorgasbord and it's perfectly okay to eat dessert first. The point is to have fun.

**SO MANY FREQUENCIES**  
**SO LITTLE TIME**

One of the first hurdles beginners have to hop over is that radio monitoring is not as simple as flipping on the car radio on the way to work. For that matter, when you go to work may even have a profound effect on how you go about enjoying the radio hobby. Many of the signals folks like to monitor can be heard better or worse depending on the time of day.

This is due to signal propagation, the science behind how a signal travels through the atmosphere between two points. You simply can't fight propagation.

Also, it is unlikely that you will ask for a shift change at work just to pursue that elusive signal from Radio Freedonia. Only you will know what portion of the day you may have to spend relaxing with the radio hobby.

Paying attention to this fact will help you settle on those bands of frequencies that will yield the most signals. If the time you have to

devote to radio monitoring falls outside of optimum long distance propagation, you may have to find your fun in the world of shorter haul communications. Some shortwave signals will be available at anytime of the day; you simply need to put your listening time into the right frequencies.

Scanner monitors find their fun right around the corner. Any VHF/UHF scanner will yield plenty of listening excitement that is not nearly as dependent on propagation as shortwave monitoring. The point is that monitoring frequencies that are optimum to the time you are able to listen will greatly reduce the frustration factor.

### TO DX OR NOT TO DX THAT IS THE QUESTION

DXing, the ability to monitor signals over great distances, is always a combination of skill, art, persistence and, most of all, luck. Some hobbyists derive a great deal of pleasure from catching a signal from a station half way around the world. Chasing DX may be fun in and of itself, but it is often made more enjoyable when it is a means to an end. The programming that those far off stations send out is usually quite interesting.

While we are on the subject, last time I checked, it wasn't carved in stone anywhere that a radio hobbyist must chase DX to be a person of worth. There are hundreds of countries that broadcast programming directed at you, the overseas listener. Many folks spend their entire radio hobby career monitoring the powerful international shortwave broadcasters. Listening to radio stations from far off lands is a great way to get to know the world around you. So don't get caught up in just filling your log with new contacts. Take some time to relax and enjoy what you're hearing as well.

Old Uncle Skip is of the school that believes that DX is any signal you never heard before. It doesn't matter one whit if it is 5 or 5000 miles away. As a radio monitor you are an explorer. The excitement of exploring new territory is wherever you choose to find it. Remember, there is no rush, folks! Just enjoy listening to your receiver, taking in the world around you at whatever speed is comfortable to you. If you remain curious in your listening, over time, the "big" DX will eventually find its way to your antenna.

### AVOID INFOGLUT

Thanks to recent developments in technology such as the Internet, it is possible to acquire large amounts of data very quickly. Home computers also allow the radio hobbyist to manage and massage this data in countless ways. Computers can even interface di-

rectly with many modern receivers. The price we pay for this technological convenience is that we can quickly become buried under a pile of data. Never forget that the hobby is supposed to be radio monitoring and not data management. Having a load of data at your fingertips can be either an aid or a burden; it's up to you.

Remember when I said earlier to take your time and listen to your radio at your own speed? If you want to avoid info glut, you will have to do the same thing with data. For most beginners, the frequency information that you will find in the pages of *MT* will keep you on the edge of your seat with plenty of great listening targets.

If the quantity of data available has you overwhelmed, it is of little use to you anyway. So throttle back and acquire the information at a speed that won't turn your hobby into a chore. Remember, the best way to eat an apple is one bite at a time. (Or byte, as the case may be.)

### PUT COMPETITION INTO PERSPECTIVE

Many radio hobby clubs run various contests or, at least, publish lists of their member's QSL totals. These activities can be great fun. They can also serve to give folks an inferiority complex. When you look at the contest totals, remember that the "winners" may be folks that have a great deal of time to devote to participating in such contests. Not everyone can put the real world on hold long enough to be among the highest scoring folks in radio contests.

Old Uncle Skip only ever scored moderately well in one contest. It happened to run during a weekend when my spouse and sons were away in Alaska and left me to manage the house. My scores would have been really great if I didn't have to stop occasionally to feed the dog. Still, it can be fun to compete on your own level. As long as you realize that you are doing your best, be proud of your contest accomplishments. It's

just a game. Nobody ever got rich and famous winning a monitoring contest. So relax and enjoy it for the sport of it. The only person you have to impress is yourself.

Likewise, do not be overly concerned about the large QSL totals that you might see published in club journals. Those folks whose names appear high on these lists have often been involved in the hobby for decades. Be willing to give yourself the same advantage of time and your personal successes will be just as great. Most beginners start off with a flourish and log between twenty and fifty countries in quick succession. After that, things tend to slack off at a fairly rapid rate.

Don't be discouraged. You will find a great deal of enjoyment monitoring those more familiar frequencies while you are taking the time to catch that next country. Don't just sit there with static coming out of the speaker. Sit back and enjoy a program on the BBC or Deutsche Welle. Relax! So as we cue in the title music and begin to run the closing credits, let me remind you for one last time...

Have fun, folks! That's what it's all about. That's all it should ever be about. I'll be down on 7040 kHz if anybody needs me...

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## To Build or to Buy?

**W**e are all born with various talents, though perhaps not always the ones we want. The problem is then to learn those skills that we need to achieve our goals. I enjoy writing computer programs and articles, teaching information on technology and astronomy. When it comes to practical matters – such as constructing receivers or repairing gutters, I have to stand aside and let the experts take over.

When I first learned about the huge amount of data coming from weather satellites, I just *had* to “get in there” – but how? Could I construct a receiver, or was it possible to buy one off the shelf? This can be a problem faced by newcomers to the WXSAT scene – build or buy?

In most cases you can answer the question thus: if you are happy with construction kits and have plenty of test gear available, you may be able to save a fair sum by self-build. I did exactly that back in 1985 when I built my first receiver board, bought in the form of a kit that required soldering the components in the appropriate order and then aligning the individual sections. Working as a tutor at an Information Technology Center, I had all the test equipment available, together with an electronics expert on the staff. The kit was assembled (largely by me) within a few days. Within a week I had it aligned and the basic board was ready for testing.

The easiest test was that of directly tuning into a known satellite frequency and waiting – without having any idea when a NOAA satellite would be passing over Britain. On the evening in question, after preparing a simple dipole antenna, I connected its feed to the signal input on the board ... clip-clop, clip-clop ... yes, there was NOAA-9, absolutely my first ever WXSAT pass, detected immediately on connecting.

Would I build another kit for satellite work? No. I much prefer to get a complete unit, in the same way that I would not consider building my own television set. I just want to use the device – not savor the (lack of) quality of my building work!

So it is with your entry into satellite monitoring. If you are able to build-it-yourself – fine. Otherwise, a glance through catalogs from vendors that offer complete and partial systems will give you an idea of what

it's going to cost to buy your preferred hardware.

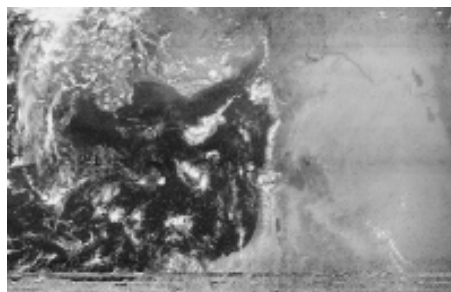
### ■ Operational WXSATs

Depending on the type of signal you use to monitor NOAA-15, your picture results may have been variable. A number of people using high-resolution picture telemetry (the signal now on 1702.5 MHz) have been reporting reception of some relatively poor data; NOAA/NESDIS are aware of the problems, which are under continued investigation. Meanwhile, automatic picture transmissions (APT) appear to be largely unaffected. Most NOAA-15 passes over Britain have been of nominal signal strength; at my own location (Plymouth, UK) I have noticed a slightly higher APT signal strength during easterly passes. This could be a function of the antenna.

I compared the signal strengths from NOAA and Meteor WXSATs by monitoring using my log periodic antenna feeding an Icom receiver during high passes. Meteor 3-5 produced the strongest signal during an easterly pass. This is reflected in the image reception, though not in the image quality itself!

Meteor 3-5 has produced somewhat variable quality images on 137.30 MHz. Sometimes the images suffer from line jitter, in which some individual lines appear longer than others. Most passes have produced good quality images. Figure 1 shows a small portion of such an image.

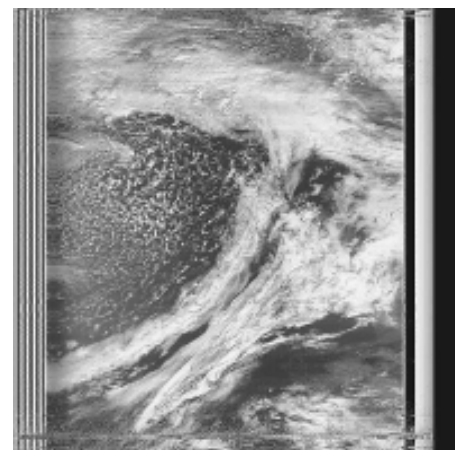
From Plymouth, UK, Meteor 3-5 is at an elevation of seven degrees when it passes over Cyprus – as seen in this image. From many locations, seven degrees is more than



**FIG 1:** Meteor 3-5 close-up of eastern Mediterranean Sea

enough to obtain a good APT signal, but my house is near the bottom of a hill that completely obscures nearly ten degrees from southeast, rising to about 15 degrees towards the east and northeast. I cannot see this region from the lower orbiting NOAA WXSATs.

The other weather satellite of the Commonwealth of Independent States – Resurs 01-N4 – has produced rather better image quality, with the exception of the anomaly along one edge. An examination of this shaded area shows a “mirror” effect. The cause of this anomaly is uncertain.



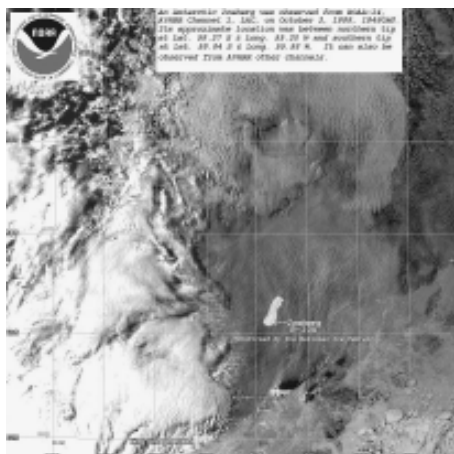
**FIG 2:** Resurs 01-N4 1144 UTC October 10

Of the NOAA WXSATs, only NOAA-14 and NOAA-15 are transmitting APT, and this may remain the situation, possibly until mid-2000. The footprints of NOAAs-12 and 15 periodically overlap due to the slight difference in their respective orbital periods. NOAA-12 is currently “catching-up” to NOAA-15 and by mid-February 2000, will largely overlap. A few months later – in spring 2000 – the footprints of the two spacecraft will have separated enough for NOAA-12's APT to be reactivated, assuming that remains the plan.

Meanwhile, the sun's reducing altitude for northern hemisphere observers leaves the mid-afternoon, ascending NOAA-14 visible-light channel looking increasingly low contrast.

### ■ Iceberg imaged by NOAA WXSAT

An Antarctic iceberg was identified in an image received from NOAA-14's channel 1 sensor on October 2, 1998 UTC. It was a large iceberg – see figure 3 – found between the Antarctic Peninsula and South America, in visible-light images from October 2 and 3. The National Ice Center in Suitland, Maryland, confirmed this as Iceberg B-10A which they had been tracking for some time. The National Ice Center is a triagency operation with representation from the U.S. Navy, NOAA and the U.S. Coast Guard. Its mission is to provide worldwide operational sea ice analyses and forecasts.



**FIG 3:** Iceberg B-10A October 3, 1999, from NOAA-14 Image courtesy OSEI Team

National Ice Center  
<http://www.natice.noaa.gov>

### ■ EMWIN – Emergency Managers' Weather Information Network

The deeper you look – the more you find! So it was when I investigated “other” transmissions available from the geostationary GOES WXSAT. Perhaps the large majority of people monitoring GOES transmissions are tuning to the 1691.0 MHz WEFAX signal. This is the one that provides almost continuous images – an invaluable resource for routine use.

Most WEFAX systems do not offer the option to tune around the band, but were you able to drop down 275 kHz to 1690.725 MHz, you would find another signal – Emergency Managers Weather Information Network (EMWIN) data. As with WEFAX, the EMWIN signal can be down-converted to the 137 MHz band – the resulting 137.225 MHz signal is then demodulated to 9600 baud.

As a fundamental part of its mission, the National Weather Service (NWS) recognizes the need to provide the emergency manage-

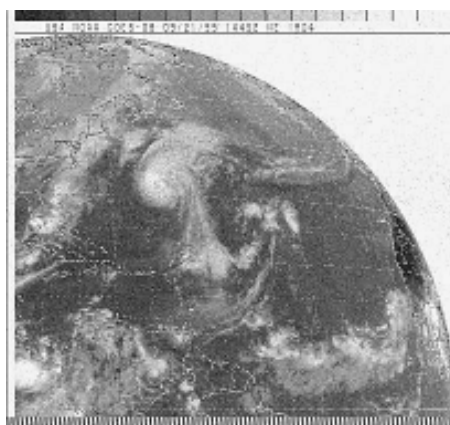
ment community with access to NWS warnings, watches, forecasts, and other products at no recurring cost. The EMWIN system was therefore developed. In partnership with the Federal Emergency Management Agency (FEMA) and other public and private organizations, EMWIN is evolving into a fully operational and supported NWS service. EMWIN is a suite of data access methods – including radio and internet, as well as satellite – which make available a live broadcast of weather and other critical emergency information.

EMWIN home page  
<http://iwin.nws.noaa.gov/emwin/index.htm>

### ■ GOES-East WEFAX – the schedule ‘uncovered’

As a short feature each month, I am looking at the types of images and data transmitted on the GOES-E WEFAX channel – 1691.0 MHz. A glance at the advertisements from various suppliers of GOES WEFAX hardware shows that the primary antenna can be either a multi-element yagi (some 40 or so dipoles are common), or a dish of approximately 1 meter diameter – followed by a low-noise preamp. A direct reception receiver tunes to the WEFAX carrier, and the subsequent data stream is produced for decoding by computer. Alternatively, a downconverter can be used to convert the WEFAX carrier from 1691.0 MHz to 137.50 MHz, and a standard WXSAT receiver used to produce the data stream.

In the last couple of editions, I discussed the sequence of transmissions starting from 0000 UTC up to 0046 UTC. A sequence of three weather charts follows before the next GOES-8 transmission – the first of the NE IR (northeast sector in infrared) at 0110 UTC.



**FIG 4:** GOES-8 NE IR sector from September 21

The earth's disc, as seen by GOES-E, is divided into four main sectors (NE, NW, SE and SW) and these are invariably transmitted in sequence. This particular group originates from a scan made at 2345 UTC.

A very careful examination of figure 4 reveals that this particular scan actually originates from much later in the day – 1445 UTC to be specific! The reason is that on the occasion of one data collection session during September, heavy rainfall late in the evening apparently caused a considerable increase in signal attenuation, as seen across the very low elevation of GOES-E from Plymouth, UK, and my computer received no further signals after mid-night! I shall try again!

### ■ Correspondence

I welcome e-mails, and would like to hear about any particularly interesting images received, together with equipment details for possible use within the column.

#### FREQUENCIES

NOAA-14 transmits APT on 137.62 MHz  
NOAA-15 transmits APT on 137.50 MHz  
NOAAs transmit beacon data on 137.77 or 136.77 MHz  
Meteor 3-5 may transmit APT on 137.30 MHz when in sunlight  
Resurs 1-4 transmits APT on 137.85 MHz  
Okean-O, Okean-4 and Sich-1 sometimes transmit APT briefly on 137.40 MHz  
GOES-8 and GOES-10 use 1691 MHz for WEFAX

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# Monitoring Y2k the Government Way

When one reads press reports and other literature regarding the millennium bug Y2k, it is quite evident that the United States government will be a key player in any outcome or potential response to problems caused by this possible electronic epidemic.

If you are planning on doing some Y2k monitoring on December 31, 1999, and you have a shortwave radio, some of the more interesting communications could originate in the high frequency (HF) bands. All the various agencies of the government will have personnel on duty New Year's Eve and you can rest

assured they are going to be communicating. And if the Y2k bug bites hard at the end of this month, HF radio is going to be the place to catch a lot of the action.

To help the newcomer to federal HF communications, this month's *Fed File* column presents an in-depth look at a variety of government agencies and their primary high frequency (HF) frequencies. A detailed list would be outside the scope of this column, but the frequencies presented below should keep you busy tuning in the action at your New Year's Eve radio party.

The mode for most of these government communications will be upper sideband (USB).

We do receive occasional reports of lower sideband (LSB) and even digital modes on these frequencies, so plan accordingly.

In addition to the frequencies below be sure to check out this month's *Utility World* column. Hugh Stegman passes along some additional details on these frequencies and the call signs of some of the government users.

Finally, to all our friends out there in fed radio land, I want to thank you all for the support you have given this column over the last year. May you and your family have a glorious holiday season and a prosperous New Year. Good fed hunting and see you next month.

## TABLE ONE: FEDERAL GOVERNMENT BY AGENCY LISTINGS

American Red Cross Falls Church, VA WGY9900: 5211.0 10493.0  
American Telephone & Telegraph (AT&T) Denver, CO WPEE 982/Conyers, GA WPEH 728: 6803.1 7480.1 14360.0 20095.0  
Civil Air Patrol: 4466.0 4469.0 4506.0 4509.0 4582.0 4585.0 4601.0 4604.0 4627.0 4630.0 7635.0 14902.0  
Defense Logistics Agency (DLA): 5063.5 11576.5 17458.5 24740.0  
Department of Energy (DOE): 7428.0 18416.0  
Department of Interior (DOI): 3253.0 4863.0 5287.5 5380.0 6766.0 7880.0  
Department of Justice (DOJ): 7672.0 10401.5 14541.0 18220.0  
Defense Information Systems Agency (DISA): 10819.0 11075.0 16320.0 17520.0  
Director of Military Support (DOMS): 13722.0 14350.0 14402.0 20906.0  
Drug Enforcement Administration (DEA): 7657.0 11073.5 14686.0 19131.0  
Environmental Protection Agency (EPA): 3360.0 4990.0 6821.0  
Federal Aviation Administration (FAA): 4055.0 6870.0 7475.0 7611.0 8125.0 11288.0 11637.0 13312.0 13457.0 15851.0 19410.0 24550.0  
Federal Bureau of Investigation (FBI): 5058.5 7903.5 14493.5  
Federal Communications Commission (FCC): 4481.5 7788.5 10653.5 14969.5  
Federal Emergency Management Agency (FEMA): 5211.0 10493.0 17519.0

KCI 610	Johnson Atoll	WGY 907	Kansas City, MO	WGY 916	Denton, TX
KPC 311	Miami, FL	WGY 908	Denver, CO	WGY 917	Berryville, VA
WGY 901	Maynard, MA	WGY 909	Sacramento, CA	WGY 918	Denver, CO
WGY 902	New York, NY	WGY 910	Bothell, WA	WGY 950	Bothell, WA
WGY 903	Philadelphia, PA	WGY 911	Maynard, MA	WGY 986	Olney, MD
WGY 904	Thomasville, GA	WGY 912	Berryville, VA	WGY 9452	Bellevue, NE
WGY 906	Denton, TX	WGY 914	Thomasville, GA		

Federal Highway Administration (FHWA): 4821.0 5255.5 7419.5 9197.0 10891.0  
Immigration and Naturalization Service (INS): 5912.5 9435.0 14585.0 24838.5  
Maritime Administration (MARAD): 5255.0 7419.5 9197.0 10891.0  
MITRE Corporation: 4952.0 12165.0 20873.0  
National Aeronautics and Space Administration (NASA): 3385.0 6982.5 14455.0  
National Coordination Center for Telecommunications (NCC): 5236.0 10586.5 14396.5 18392.0  
National Communications System-NTCN (NCS): 2302.4 2382.0 4619.4 4621.6 6766.4 6768.4 6845.0 9054.0 9065.4 9070.0 9274.6 11449.4 13801.4 13809.4 18946.0 25347.0  
National Telecommunications Alliance, Inc. (NTA): 4610.5 5099.1 7552.1 11451.0 18063.0  
National Telecommunications and Information Administration (NTIA): 9973.0 13423.0 18178.5  
State Emergency Operation Centers: 5211.0 10493.0

WGY 921	Concord, NH	WGY 933	Pikesville, MD	WGY 948	Bismark, ND
WGY 923	Harrisburg, PA	WGY 934	Columbia, SC	WGY 951	Hartford, CT
WGY 924	Nashville, TN	WGY 938	Cheyenne, WY	WGY 954	Clanton, AL
WGY 925	Madison, WI	WGY 939	Sacramento, CA	WGY 958	Helena, MT
WGY 926	Oklahoma City, OK	WGY 940	Salem, OR	WGY 966	Conway, AR
WGY 928	Pierre, SD	WGY 941	Augusta, ME	WGY 968	Golden, CO
WGY 929	Carson City, NV	WGY 942	Albany, NY	WGY 974	Tallahassee, FL
				WGY 977	Jefferson, MO

Urban Search and Rescue (US&R): 5211.0 10493.0

KCP 314	Beverly, MA
KPC 313	Rockville, MD
KPC 326/327	Chantilly, VA

US Air Force MARS: 3311.0 4455.0 4490.0 4590.0 7302.0 7540.0 13993.0  
US Air Force Reserve Tampa, FL Black Forest/San Antonio, TX Big Lake: 4341.0 8495.0 11470.0 11816.0  
US Army 1111 Sig Battalion WAR 46: 4018.5 4024.5 5761.5 7309.5  
US Army 1st USA Atlanta, GA S4L: 8048.5 10797.5 16318.5 17478.5  
US Army 1st USA Fort Jackson, SC S8H: 8048.5 10797.5  
US Army Corps of Engineers (USACE): 6785.0 11693.5 12070.0 16327.4

**US Army MARS:** 3347.0 6996.0 13996.0 14487.0  
**US Army Material Command (USAMC):** 5087.0 10233.5 14653.0 16077.0  
**US Army National Guard:** 4001.5 4035.0 4240.0 4244.5 4250.0 4296.0 4441.5 4445.0 4520.0 4555.0 4580.0 4607.0 4610.0 4780.0 4860.0 4927.5  
 4960.0 5023.5 5045.0 5062.0 5087.0 5205.0 5215.5 5432.5 5821.5 6010.0 6766.0 6910.5 6992.0 7361.0 8038.5 8047.0 8056.0 8057.5 8158.5 8161.5  
 8180.0 8622.0 9357.0 13722.0 14653.0 20906.0  
**US Army Puerto Rico:** 9990.0 10165.0 10815.0 14930.0  
**US Coast Guard:** 4048.5 7528.5 11434.5 15473.5  
**US Customs Service:** 8912.0 11494.0  
**US Department of Agriculture:** 5901.0 9270.0 11494.0 14955.0  
**US Marine Corps 44<sup>th</sup> Medical Brigade (Fort Bragg, NC) Striker 1:** 6997.5 13996.0 14488.5 14665.0  
**US Marine Corps Mountain Warfare Training Center (MWTC):** 5031.5 10179.5  
**US Navy-Marine Corps MARS:** 4003.5 4041.0 7381.0 14383.5 14441.5  
**US Navy Space and Naval Warfare Systems Center (SPAWARSSYSCEN):** 6427.0 8689.0 12687.0 18738.0  
**US Transportation Command (USTRANSCOM):** 5300.0 5300.5 9120.5 10493.0 11628.5 12057.0 20994.0  
**Veterans Administration (VA):** 5038.5 12076.0 23355.5

**TABLE TWO: FEDERAL GOVERNMENT BY FREQUENCY LISTING**

2302.4	NCS	5901.0	US Department of Agriculture	11434.5	US Coast Guard
2382.0	NCS	5912.5	INS	11449.4	NCS
3253.0	DOI	6010.0	US Army National Guard	11451.0	NTA
3311.0	USAF MARS	6427.0	SPAWARSSYSCEN	11470.0	USAF Reserve
3347.0	USA MARS	6766.0	DOI/US Army National Guard	11494.0	US Customs Service/US Department of Agriculture
3360.0	EPA	6766.4	NCS		DLA
3385.0	NASA	6768.4	NCS	11576.5	USTRANSCOM
4001.5	US Army National Guard	6785.0	US Army Corps of Engineers	11628.5	FAA
4003.5	Navy-Marine Corps MARS	6800.0	Shares Coordination Network (BBS) Channel 9	11637.0	US Army Corps of Engineers
4018.5	1111 <sup>th</sup> Signal Battalion (WAR 46)	6803.1	AT&T	11693.5	USAF Reserve
4024.5	1111 <sup>th</sup> Signal Battalion (WAR 46)	6821.0	EPA	11816.0	USTRANSCOM
4035.0	US Army National Guard	6845.0	NCS	12057.0	US Army Corps of Engineers
4041.0	Navy-Marine Corps MARS	6870.0	FAA	12070.0	Veterans Administration
4048.5	US Coast Guard	6910.5	US Army National Guard	12076.0	MITRE
4055.0	FAA	6982.5	NASA	12165.0	SPAWARSSYSCEN
4240.0	US Army National Guard	6992.0	US Army National Guard	12687.0	Shares Coordination Network (BBS) Channel 10
4244.5	US Army National Guard	6996.0	USA MARS	13242.0	FAA
4250.0	US Army National Guard	6997.5	44 <sup>th</sup> Med BDE Fort Bragg, NC (Striker 1)	13312.0	NTIA
4296.0	US Army National Guard	7302.0	USAF MARS	13423.0	FAA
4341.0	USAF Reserve	7309.5	1111 <sup>th</sup> Signal Battalion (WAR 46)	13457.0	DOMS/US Army National Guard
4441.5	US Army National Guard	7361.0	US Army National Guard	13722.0	NCS
4445.0	US Army National Guard	7381.0	Navy-Marine Corps MARS	13801.4	NCS
4455.0	USAF MARS	7419.5	FWHA/MARAD	13809.4	USAF MARS
4466.0	Civil Air Patrol	7428.0	DOE	13993.0	44 <sup>th</sup> Med BDE Fort Bragg, NC (Striker 1)/USA MARS
4469.0	Civil Air Patrol	7475.0	FAA	13996.0	DOMS
4481.5	FCC	7480.1	AT&T	14350.0	AT&T
4490.0	Shares Coordination Network (ALE) Channel 3/USAF MARS	7528.5	US Coast Guard	14360.0	Navy-Marine Corps MARS
4506.0	Civil Air Patrol	7540.0	USAF MARS	14383.5	NCC/Shares Coordination Network (Voice) Channel 2
4509.0	Civil Air Patrol	7552.1	NTA	14402.0	DOMS
4520.0	US Army National Guard	7611.0	FAA	14441.5	Navy-Marine Corps MARS
4555.0	US Army National Guard	7635.0	Civil Air Patrol	14455.0	NASA
4580.0	US Army National Guard	7657.0	DEA	14487.0	USA MARS
4582.0	Civil Air Patrol	7672.0	DOJ	14488.5	44 <sup>th</sup> Med BDE Fort Bragg, NC (Striker 1)
4585.0	Civil Air Patrol	7788.5	FCC	14493.5	FBI
4590.0	USAF MARS	7880.0	DOI	14541.0	DOJ
4601.0	Civil Air Patrol	7903.5	FBI	14580.0	INS
4604.0	Civil Air Patrol	8038.5	US Army National Guard	14653.0	US Army National Guard/USAMC
4607.0	US Army National Guard	8047.0	US Army National Guard	14665.0	44 <sup>th</sup> Med BDE Fort Bragg, NC (Striker 1)
4610.0	US Army National Guard	8048.5	1 <sup>st</sup> USA Army Atlanta (S4L)/Fort Jackson (S8H)	14686.0	DEA
4610.5	NTA	8056.0	US Army National Guard	14902.0	Civil Air Patrol
4619.4	NCS	8057.5	US Army National Guard	14930.0	US Army Puerto Rico
4621.6	NCS	8125.0	FAA	14955.0	US Department of Agriculture
4627.0	Civil Air Patrol	8158.5	US Army National Guard	14969.5	FCC
4630.0	Civil Air Patrol	8161.5	US Army National Guard	15094.0	Shares Coordination Network (ALE) Channel 7
4780.0	US Army National Guard	8180.0	US Army National Guard	15473.5	US Coast Guard
4821.0	FWHA	8495.0	USAF Reserve	15851.0	FAA
4860.0	US Army National Guard	8622.0	US Army National Guard	16077.0	USAMC
4863.0	DOI	8689.0	SPAWARSSYSCEN	16318.5	1 <sup>st</sup> USA Army Atlanta (S4L)
4927.5	US Army National Guard	8912.0	US Customs Service	16320.0	DISA
4952.0	MITRE	9054.0	NCS	16327.4	US Army Corps of Engineers
4960.0	US Army National Guard	9065.4	NCS	17458.5	DLA
4990.0	EPA	9070.0	NCS	17487.0	Shares Coordination Network (ALE/STI) Channel 8
5023.5	US Army National Guard	9106.0	Shares Coordination Network (ALE) Channel 5	17487.5	1 <sup>st</sup> USA Army Atlanta (S4L)
5031.5	MWTC	9120.5	USTRANSCOM	17519.0	FEMA
5038.5	Veterans Administration	9197.0	FWHA/MARAD	17520.0	DISA
5045.0	US Army National Guard	9270.0	US Department of Agriculture	18063.0	NTA
5058.5	FBI	9274.6	NCS	18178.5	NTIA
5062.0	US Army National Guard	9357.0	US Army National	18220.0	DOJ
5063.5	DLA	9435.0	INS	18392.0	NCC
5087.0	US Army National Guard/USAMC	9973.0	NTIA	18416.0	DOE
5099.1	NTA	9990.0	US Army Puerto Rico	18738.0	SPAWARSSYSCEN
5205.0	US Army National Guard	10165.0	US Army Puerto Rico	18946.0	NCS
5211.0	American Red Cross, FEMA, State EOCs	10179.5	MWTC	19131.0	DEA
5215.5	US Army National Guard	10233.5	USAMC	19410.0	FAA
5236.0	NCC/Shares Coordination Network (Voice) Channel 1	10401.5	DOJ	20095.0	AT&T
5255.0	MARAD	10493.0	American Red Cross, FEMA, State EOCs, USTRANSCOM	20873.0	MITRE
5255.5	FWHA	10586.5	NCC	20906.0	DOMS/US Army National Guard
5287.5	DOI	10653.5	FCC	20994.0	USTRANSCOM
5300.0	USTRANSCOM	10797.5	1 <sup>st</sup> USA Army Atlanta (S4L)/Fort Jackson (S8H)	23355.5	Veterans Administration
5300.5	USTRANSCOM	10815.0	US Army Puerto Rico	24550.0	FAA
5380.0	DOI	10819.0	DISA	24740.0	DLA
5432.5	US Army National Guard	10891.0	FWHA/MARAD	24838.5	INS
5711.0	Shares Coordination Network (ALE) Channel 4	11073.5	DEA	25347.0	NCS
5761.5	1111 <sup>th</sup> Signal Battalion (WAR 46)	11075.0	DISA		
5821.5	US Army National Guard	11217.0	Shares Coordination Network (ALE) Channel 6		
		11288.0	FAA		

# Forth Worth Air Traffic Control

**W**elcome aboard everyone; Merry Christmas, Happy Hanukkah, and Happy New Year. Our first stop today is at the Fort Worth Air Route Traffic Control Center. Thanks to Tim Sawtelle for permission to use this material.

Location	Frequency	Sector
Abilene, TX	127.450	Abilene Low Sector
Ardmore, TX	128.100	Ardmore Low Sector
Ardmore, TX	132.975	Ardmore High Sector
Big Spring, TX	133.700	Midland Low Sector
Blue Ridge, TX	124.875	Seavir Intermediate Sector
" "	127.600	Blue Ridge Low Sector
Brownwood, TX	127.450	Abilene Low Sector
Clinton, OK	128.400	Oklahoma City Low Sector
"	132.450	Oklahoma City High Sector
Cumby, TX	126.575	Texarkana High Sector
"	132.025	Quitman Intermediate Sector
"	132.850	Lake Low Sector
Dublin, TX	127.150	Acton Low Sector
"	128.325	Hicoe High Sector
"	134.250	Abilene High Sector
"	135.375	Ednas Intermediate Sector
El Dorado, AR	128.200	Monroe Low Sector
Gainesville, TX	126.775	Gainesville Intermediate Sector
"	133.250	Bridgeport Low Sector
"	134.150	Frisco Low Sector
Hobbs, NM	133.100	Midland Low Sector
Lubbock, TX	127.700	Reese Low Sector
"	133.350	Turki High Sector
Marshall, TX	128.125	Red River Ultra High Sector
McAlester, OK	132.200	McAlester Low Sector
"	134.475	Decod High Sector
"	135.450	McAlester High Sector
Midland, TX	133.100	Midland Low Sector
"	132.075	Wink High Sector
Mineral Wells, TX	127.000	Millsap Low Sector
"	135.275	Possum Intermediate Sector
Monroe, LA	135.100	Monroe Low Sector
Oklahoma City, OK	132.450	Oklahoma City High Sector
Paducah, TX	126.450	Lubbock Low Sector



"	133.350	Turki High Sector
"	133.500	Wichita Falls Low Sector
"	134.550	Wichita Falls High Sector
Paris, TX	133.950	Texarkana Low Sector
Plainview, TX	126.450	Lubbock Low Sector
San Angelo, TX	126.150	Midland Low Sector
"	132.075	Wink High Sector
Scurry, TX	126.725	Donie Intermediate Sector
"	135.750	Dallas High Sector
Shreveport, LA	132.275	Paxto High Sector
"	133.875	El Dorado High Sector
"	135.100	Monroe Low Sector
Texarkana, AR	126.575	Texarkana High Sector
"	133.850	Texarkana Low Sector
"	134.750	Decod High Sector
Tyler, TX	134.025	Frankston High Sector
"	135.250	Scurry Low Sector
Waco, TX	133.300	Waco Low Sector
Wichita Falls, TX	127.850	Bowie Intermediate Sector
"	132.925	Woven High Sector
"	133.500	Wichita Falls Low Sector
"	134.550	Wichita Falls High Sector

Austin, Texas, and north as far as Tulsa, Oklahoma. Aircraft is worked from the ground up to Flight Level 600 (60,000 feet). Aircraft operations conducted each year consistently average over 2.1 million. This includes general aviation, commercial and military operations.

The most aircraft worked in one day was on September 24, 1997, when over 7755 operations were worked in one 24 hour period.

Fort Worth Center has over 350 controllers with the majority of them at FPL (Full Performance Level). FPL means that they have been fully trained and are checked out. There are many controllers at different levels of training. Some are working in the control room under the supervision of an OJTI (on the job training instructor); that's a controller that has received special training to teach new controllers how to control aircraft.

### ■ The Display System Replacement

(Note: this display is the one which controllers use to monitor and "work" air traffic. jb)



Ft. Worth ARTCC owns over 174 thousand square miles of airspace. This airspace is as far west as El Paso, Texas, east as far as El Dorado, Arkansas, south almost as far as

The Display System Replacement (DSR) will replace the aging air traffic computer equipment at Fort Worth ARTCC (ZFW). The Main Display Monitor (MDM) for DSR is a 20-inch by 20-inch square color display, replacing the 19-inch circular monochrome Plan View Display (PVD).

By using Reduced Instruction Set Computer (RISC) processing technology, DSR will improve the speed, reliability, and capacity of the air traffic system. This new hardware will also serve as a platform for any air traffic system upgrades in the future.

"Continental 1231, Fort Worth Center, roger. Deviate west as necessary. When able proceed direct Cowboy J87 Bilee, rest of route unchanged. Climb and maintain flight level 230"

This was the first operation delivered using the DSR equipment at ZFW. Transition to DSR began on 4/29/99. Total transition to the new DSR control room was completed on 5/12/99.

And last but not least, an ATC funny from "Heard on Frequency" at ZFW!

**ZFW:** "Delta 468, turn 30 degrees right for spacing.."

**Delta:** "Roger 30 right, hey center, are you turning us out to let the traffic behind us go in front of us?"

**ZFW:** "Why would I do that?"

**Delta:** "Well we were just watching our TCAS and noticed the traffic behind us."

**ZFW:** "Well don't do that!"

Thanks, Tim! Visit ZFW's website at <http://www.zfwartcc.jcabi.gov> Tell them you saw it in *MT*!

### ■ Book Review

If you are interested in air traffic control, you are really in luck, because there's a new book on the market called *Five Miles And A Thousand Feet* which takes you, via five fictional novelettes, behind the scenes of several Air Route Traffic Control Centers in the US. Written by an air traffic controller, this book is the best one on ATC that this writer has read since *Pressure Cooker* back in the early 1980s; once I started reading it, I couldn't put it down!

Drawing from his many years "on the boards" in an ARTCC environment, Bob Tatosian has drawn vivid word pictures of controllers and the air traffic with which they

work. The book is \$11.95 plus \$3.00 postage and handling. To order, send your check or money order to: Sunshine Communications, P.O. Box 231, Farmington, MN 55024. You'll want to add this book to your collection for sure; don't miss it!

### ■ A New Video from The Flying Pig!

If you like nonstop airline and ATC action, The Flying Pig has the video for you. "Airports of the World - LAX" (Los Angeles 98) has all of the above and more. Hear and see aircraft from EMB-120RTs through Boeing 777s, and airlines including Aero California through VASP. Air traffic control transmissions are heard throughout this exciting presentation.

Videos from The Flying Pig are priced very reasonably at \$19.95. This particular volume is part one of a set of two concerning LAX. They can be reached on line at [www.airportworld.com](http://www.airportworld.com) or at P.O. Box 69, Kingston, MA 02364; their phone number is (781) 585-5796. This is one video you don't want to miss.

That's all for this month; we'll see you in January. Until then, 73 and out!

## FRS WALKIE-TALKIES: GREAT RANGE, GREAT PRICE!

Choose from either of these 14 channel UHF walkie-talkies and enjoy two-way communications up to a mile or more—no license required! Pick the walkie-talkie at the right price and with the right features for you!

GE "Sedona" has a belt clip, low battery light, digital channel readout, transmit light, pushbutton channel selection, paging button, rotary on/off volume control, automatic squelch, and earphone jack. It operates from three AA cells (earphone and batteries not included). **Order TR8 for only \$59.95 plus \$5.95 US Priority Mail or UPS Shipping.**



Cobra "Microtalk" has all the features above, but adds 38 CTCSS tones to reduce co-channel interference, voice scrambling for privacy, incoming call alert, completed transmission beep, retractable antenna, speaker/mike jack. Operates from four AAA cells (earphone/mike and batteries not included). **Order TR31DS for only \$109.95 plus \$12 US Priority Mail or UPS Shipping.**



### Grove Enterprises, Inc.

800-438-8155 (US and Canada); 828-837-9200; 828-837-2216 (Fax)

7540 Hwy 64W; Brasstown, NC 28902

web: [www.grove-ent.com](http://www.grove-ent.com); e-mail: [order@grove-ent.com](mailto:order@grove-ent.com)

# GROVE

## Crystal Ball

**"P**redicting.. Puts me down on shaky ground.." (Let's Active, 1983) It seems traditional to make predictions at the beginning of a new year. I normally resist that tradition, but with the special significance of *this* new year, I'm going to give in to temptation. Here are a few of my predictions for what will happen to domestic-band broadcasting, and DXing, in the opening years of the new millennium.

AM DXers hate to admit it, but the band's days as a venue for commercial broadcasting are limited. Schemes for digital broadcasting in the 530-1710 kHz band are being tested; some of them may even work. They won't address the problem of limited nighttime coverage. I rather suspect few listeners will bother buying "digital AM" receivers, and it will go the way of AM stereo. Successful AM formats will continue the gradual drift onto the FM band.

I believe that by the year 2015, AM will be obsolete in the U.S. as a commercial broadcasting band. The obsolescence of AM will take longer in Central and South America. International DX will become considerably easier, until the band is eventually totally abandoned. I would not be surprised to see unlicensed broadcasting made legal in this band.

Analog FM will last longer. Few FM stations are affected by the coverage problems that plague the AM band. LPFM will be adopted very early in the new century. (In fact, the FCC has indicated it may act *before* the end of this year.) This service will bring hundreds, if not thousands, of small stations to the dial. Many of these will carry diverse political opinions, local information, and ethnic programming. The downside is that LPFM stations will fill many of the gaps in the FM band on which DXers rely.

Terrestrial digital radio will get started in the U.S. about the same time as LPFM. (Again, some action is expected late this year or early next year.) It will be much less successful. Again, listeners will find little reason to buy a digital receiver to get programming that's already available in analog.

Satellite digital radio is also off to a slow start. Sometime in the next 25 years, one of the satellite companies will find a way to insert local content into their datastream. The appearance of local news, sports, weather, and traffic reports on satellite digital stations will result in rapid growth. By 2025, it will be



*If you didn't think that digital TV could be DXed, let this photo of reception of WDIV-DT Detroit change your mind. This photo was taken by DXer Jeff Kadet in western Illinois, 416 miles from the transmitter.*

impossible to tell a satellite digital station from a terrestrial station—except that satellite radio will offer every conceivable format. If you really *want* all-Elvis radio, it'll exist. By 2040, the 88-108 MHz band will also be obsolete as a place for commercial operation and will also become available for unlicensed broadcasting.

Domestic-band DXers are a resilient bunch. When the hobby began, there were fewer than 1,000 stations in the U.S.; most of them signed off between midnight and 6am; the "clear channels" really were clear; stations identified themselves by call letters on the hour. The



*Contrary to previous reports, less-than-perfect digital TV reception does yield something other than a blank screen. This is what WFLD-DT Chicago looks like from 180 miles away with interference from an analog TV station on the same channel.*

DXer of 1934 would probably find modern conditions intolerable. But we persevere, and we continue to log interesting DX!

### ■ Bits and Pieces

- The first reports of digital TV DX have now appeared. Jeff Kadet of western Illinois has DXed at least six different DTV stations at distances up to 416 miles. He's testing a new TV tuner card for PC computers which supports reception of both analog and digital stations. Two pictures of DTV DX appear elsewhere on this page; you can see more at <http://pages.athome.net/fmdx/hdtv.html>

- Brian Akey asked about a more up-to-date listing of expanded-band stations, after seeing the list I printed in my February column. The most recent listing appeared in the September issue; new lists will appear from time to time as major changes occur. A good way to keep in touch with the very latest changes is to join the National Radio Club. Visit <http://nrcdxas.org/member/> or send two 33-cent stamps or an International Reply Coupon to Box 164, Mannsville NY 13661-0164 for a sample newsletter with membership information.

- Brian also asked whether anything besides tourist-information stations are permitted on 1610 kHz. The FCC appears to have reserved 1610 kHz for these low-power information stations. *One* regular expanded-band allotment has been made on this frequency: KALT-900 in Atlanta, Texas. Their construction permit has not yet been issued.

Canada's only expanded-band station is also on 1610. CHEV Toronto is licensed for the rather odd power of 99 watts, and is a mobile station used at area sporting events. And, there is a religious station ("Caribbean Beacon") on Anguilla in the British West Indies on this frequency; this station is frequently heard in the southeastern U.S. when conditions are good.

The expanded band continues to be very popular with DXers, but you shouldn't ignore the regular segment either. The former CBC frequencies 690, 740, 940, and 1580 continue to be open, allowing for some very interesting loggings by Eastern DXers.

How are you doing on these channels? Write me at Box 98, Brasstown NC 28902-0098, or by email to [w9wi@bellsouth.net](mailto:w9wi@bellsouth.net). Good DX!



## Winter Propagation Boosts Europriates

Some of the most challenging and enjoyable DX listening on the short-wave bands can be found in the chase for transatlantic pirate radio reception. Winter propagation conditions, with good darkness paths between Europe and North America near and after our sunset, significantly increase our odds of success. Europeans report even better results in the opposite direction for North American pirates, usually after 2000 UTC.

Among the Europriate stations, the most consistently heard signals still come from **SWRS**. They use several frequencies and transmitters, so tuning to 3905, 6245, 7485, 11470 and 21860 kHz on the weekends is the strategy to use. They say that 11470 kHz is their "main" frequency, with others in use for "special broadcasts." Mahendra Vaghjee heard them in Mauritius, and with persistence, you can log them too! Weekends are the time to check, since this is when they are active. Reports go to the Wuppertal address.

**Laser Hot Hits**, a slick and professionally produced rocker on 6218.9 kHz, made it to Ross Comeau's shack in Andover. Among Europriate stations, this one is fairly widely heard. Check <http://www.hothits.cjb.net> for more info at their web site.

Our regular reporter and Europriate expert Ranier Brandt says that recent activity has been concentrated between 6200 and 6270 kHz on 49 meters, with quite a few other stations active on 41 meters between 7370 and 7500 kHz. Sometimes **Wrekin' Radio International** uses 12256 kHz, but they normally are active after 0700 UTC, keeping us up late at night!

On the downside, 14 Dutch police and six Netherlands PTT enforcement officials raided the famous **Farmers From Holland** more than once in September, knocking them off the air. Their announcers always consumed plenty of malt beverages while sending signals to DXers' beverage antennas, leading to some amusing results before the major bust. Their web site at <http://www.fly.to/farmers> is still worth a try, sometimes with audio. They use a postal address of PO Box 108, 7720 AC Dalfsen, Netherlands.

Although it's not in Europe, **Radi Cochiguaz** has been active about once a month between 2300-0500 UTC from South America on 6950 kHz using lower sideband



### It's Europriate Time!

modulation. They relay other pirates when not transmitting their own shows. If you hear them, Box 159, Santiago 14, Chile, is their current address.

### ■ Clandestine Radio Watch

Editor Martin Schoech advises that the *Clandestine Radio Watch* internet newsletter went on a temporary vacation in October, but he anticipates that it should be back by the time that you read this. You can check <http://www.swl.net/swl-de/swl-cla.html> on the internet for the latest status update, or to download the latest issue of this wonderful information resource. There is no better clandestine radio resource available today!

### ■ What's on the Air

Our readers heard all of these pirates last month; let us know what you have logged lately! North American pirate activity still flip-flops between 6950 and 6955 kHz, avoiding interference from Peru and China. If either channel is clear, this is the place to tune for shortwave pirate activity. Weekends around sunset are still the best times to tune in, although morning and afternoon broadcasts are becoming normal fare. We list programming formats and contact maildrops here:

**Alan Masyga Project-** The station, named after a pirate DXer, airs Alan Parsons music. (Providence)

**KIPM-** They feature elaborately produced historical sketches. (Lula)

**Lounge Lizard Radio-** Lounge music, always from a hotel lounge. (Providence)

**Midi Radio-** A new one, with electronic computer music. ([midiradio@yahoo.com](mailto:midiradio@yahoo.com) e-mail)

**Radio Bingo-** Yes, the shortwave bingo game is still with us. (None)

**Radio Corbain-** Guess which modern rock star has his music featured here? (None yet)

**Radio Metallica Worldwide-** Dr. Tornado's blockbuster 15 kW transmitter is still the best heard pirate. (Blue Ridge Summit)

**Radio Nonsense-** Despite Joe Mama's fatal accident, tapes of his funny shows have reappeared. (Belfast)

**Radio 510 International-** DJ Stevie sometimes relays the legendary **Voice of Pancho Villa**, lately via North American relays. (Basel)

**WHYP-** The James Brownyard station memorializes his Great Lakes licensed shows on 1530 kHz.

([whyp1530@yahoo.com](mailto:whyp1530@yahoo.com) e-mail)

**WMFQ-** They feature rock, but are mainly a promotion for QSLs. (Providence)

**WMPR-** Their techno-rock "dance party" theme always has a good signal. (Still none)

**WRX-** Jimmy the Weasel signed off one night because his listeners were "sorry." (Manomet)

**WWRX-** This parody of Jimmy the Weasel's pirate station remains amusing. (None)

**WRYT-** Rock music is the standard fare here. (Belfast)

**WSRR-** Dr. Love's Solid Rock Radio mixes rock, soul, hip hop, and other music. (Belfast)

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign addresses. Send your letters to PO Box 1, Belfast, NY 14711, PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 24, Lula, GA 30554; PO Box 1464, Manomet, MA 02345; Postfach 220342, 42373 Wuppertal, Germany, and PO Box 510, CH 4010 Basel, Switzerland.

### ■ Thanks!

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail addresses atop the column. We appreciate material sent in this month by John T. Arthur, Belfast, NY; Shawn Axelrod, Winnipeg, Manitoba; Kirk Baxter, North Canton, OH; Ranier Brandt, Hofer, Germany; Jerry Coatsworth, Merlin, Ontario; Ross Comeau, Andover, MA; Ed Cummings; Joe Filipkowski, Providence, RI; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; William Hassig, Mt. Prospect, IL; Kenneth Hydeman, Xenia, OH; Ed Kusalik, Coaldale, Alberta; Ben Loveless, Bloomfield Hills, MI; Greg Majewski, Oakdale, CT; Ruben Manischavitz, Necedah, WI; Bill McClintock, Minneapolis, MN; Dann McKee, Windermere, FL; John Oldenburg, Appleton, WI; Martin Schoech, Merseburg, Germany; DJ Stevie, Basel, Switzerland; Keith Thibodeaux, LA; Mahendra Vaghjee, Rose Hill, Mauritius; Enrique Alejandro Wernbagher, Buenos Aires, Argentina; Niel Wolfish, Toronto, Ontario; Dave Zantow, Janesville, WI.

## A Look Back

While preparing to write this month's column, I tried to think of the best way to close out the year, the century, and the millenium. Thumbing through my back files, I came across a letter received in 1992 from G. William Phelps (Encinitas, CA) that struck a chord in me. Mr. Phelps kindly gave his permission to share the letter with you. It details his experience as a young radio operator during WW2. Besides being an extremely well-written piece, Bill's letter points out how important radio was (and is) for safe navigation on the high seas. Here is Bill's letter:



*The National RBL-5 longwave receiver was standard gear aboard many ships during WW2.*

"On July 12, 1941, I sailed out of New York as third radio operator on the passenger ship *SS Seminole-WNCX*. I was still in my teens and had just completed a radio operating course at RCA Institutes, and had obtained my FCC radiotelegraph operator license.

This had been my dream since I had been given a crystal set while still in elementary school. All during high school I studied electricity and radio, made receivers and worked very diligently on mastering Morse code. I got to know hams like W2VP, a railroad telegrapher by day, who liked to work 160 meter CW at home. I was issued W2NZF.

The *Seminole* sailed from New York to Miami and islands in the West Indies. The ship's 800 watt transmitter operated from 500 to 375 kHz. The sounds that came from the receiver's loudspeaker were like beautiful music, as each shore station was always operated by superb operators, and each station had its own personality.

RCA's New York City station was WNY, and they had a style of always omitting the "de" (from) between call signs, just sending the call letters of the station called followed immediately by their call letters, and they always elongated the initial dash in the Y of their call sign. Among the other shore stations along the East Coast that were always busy were WCC at Chatham, Massachusetts (see *this month's feature article*- ed.), WSL, WSC and WMR at Miami.

As to navigation, we would periodically get a call from the chart room asking

us to get a bearing. We would then call on 375 kHz to one of the strategically placed Coast Guard direction finding stations, and ask for a bearing (QTE). We would then be told to send the letters MO continuously, using very long dashes, so that they could take a bearing on our signal. These navigation stations were connected by land line, so that the shore station would then send us bearings from three stations. We would then give these bearings to the navigation officer, for plotting on his chart. I always enjoyed this assignment.

Another below 500 kHz navigational duty was to get the exact time for the ship's chronometer. We didn't use WWV then, but would receive "time ticks" from NAA/NSS. These time ticks would begin at five minutes before certain specified hours, and end with a long dash on the hour. We would note in the chronometer log the number of minutes and seconds that this clock was either fast or slow. The chronometer itself was never reset aboard ship, the time corrections simply being entered into the navigational computations.

I was at sea on December 7, 1941, and received a special message to the ship's captain directing him to open the envelope containing instructions which had been given to him before sailing.

In January I then sailed as the sole operator on a cargo ship, the *Eldena*, for Murmansk, Russia. I won't detail here all of the experiences of this trip in going from New York to Boston to Halifax to

Reykjavik, to Greenock in Scotland to Loch Ewe in Northern Scotland and finally on to Murmansk, and all the battle experiences we encountered north of the Arctic Circle.

Before every sailing the captains and the radio operators would be taken ashore from anchorage for a convoy conference. We were given exact instructions concerning radio operations, and were given secret code books for deciphering our messages.

After we left Loch Ewe in convoy, we encountered the winter storms for which the North Atlantic is notorious. Our old, heavily laden cargo ship would shake as we would wallow in deep troughs, and then be cast high upon the sea. We became totally separated from the convoy, without a ship in sight.

I would receive from London each day on 16 kHz an encoded message giving the rendezvous position for that day. Each day we would come closer to making the rendezvous until in fact we were back together. Those signals on 16 kHz were a joy to receive, as they were solid and steady and great to copy. There was much, much more to this story as to what happened to us, and I was always proud of the role that radio played on that voyage.

I went on other ships and other voyages, both in wartime and peacetime, was shipwrecked off India, and visited every inhabited continent. In every case, 500 kHz and below, played an exciting and vital role. Later, for a brief period, I was an airplane radio operator for an airline flying across the Pacific. I subsequently went to college, married Betty Lee, who became W6CEH, and we both became members of the California bar, and practiced law together.

I always enjoy "Below 500 kHz" and *Monitoring Times*. As I read it, I think: so this is how it all turned out!"

73, G. William Phelps

My sincere thanks to Bill for sharing his letter. I trust that the holidays will bring each of you some excellent longwave monitoring as well as special family times. Peace, and see you in 2000.



# NEW UNIDEN SCANNERS WITH AM/FM AND WEATHER ALERT!

Loaded with unique features, and low in cost, the new BC 278CLT scanner from Uniden has not only wide scanner coverage, but AM/FM broadcasting, specific area weather alert (SAME), and an alarm clock as well!

This isn't just a bedside radio (although it is a good one!); it boasts 520-1720 kHz (AM broadcast) and 88-108 MHz FM broadcast, as well as 29-54, 108-174, 406-512, and 806-960 MHz (less cellular) scanner frequency coverage with 100 memory channels, and excellent (0.4 microvolt) sensitivity.

Load up to 100 of your local scanner frequencies, or simply press the service search button and the radio will rapidly scan its factory-preprogrammed memory files to find active frequencies for you! And during storm season, the radio will alert you to impending danger with its alarm!

At the touch of a key, you can switch between local broadcasting (with up to 20 memory presets!), emergency weather messaging, wide-coverage scanner action (air, sea, and land!), or simply listen to news, sports, talk shows, or music on your favorite AM/FM stations!

The BC 278CLT shows its information on a large, backlit LCD, and is powered by an AC wall adaptor (included). An AM-band loop antenna, plug-in whip, AC adaptor, and manual included. *(NOTE: Scanner will work on 12 volt DC car battery, but the clock will not work.)*



BC248CLT

For less demanding requirements, order the model BC 248CLT. Specifications are similar, but it has only 50 memory channels, Motorola antenna jacks, no service search, or 800 MHz coverage, or aircraft band.



BC278CLT

ORDER SCN 33 (BC278CLT) only **\$179<sup>95</sup>\***

ORDER SCN 31 (BC248CLT) only **\$119<sup>95</sup>\***

\*Please add \$12.00 for UPS shipping or US Priority Mail

**Accessories:**

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## The Evolution of PCS

*What does it mean these days to stay in touch?*

**P**ersonal Communications Services (PCS) have evolved rapidly from the early days of cellular telephones. Bulky car-mounted phones have given way to sleek, hand-held terminals offering voice, electronic mail, and even access to the worldwide web.

Wireless services have become very popular. At the end of last year there were more than 300 million subscribers around the world, compared to just 11 million in 1990. Since 1996 the number of new mobile subscribers has exceeded the number of new fixed wireline customers, and nearly a third of all telephone connections now involve at least one mobile phone.

PCS continues to evolve and diverge into different market niches. One such niche involves moving the cellular towers into space. Such systems, formally called global personal communications by satellite (GMPCS), are part of the next generation of "anytime, anywhere" connectivity.

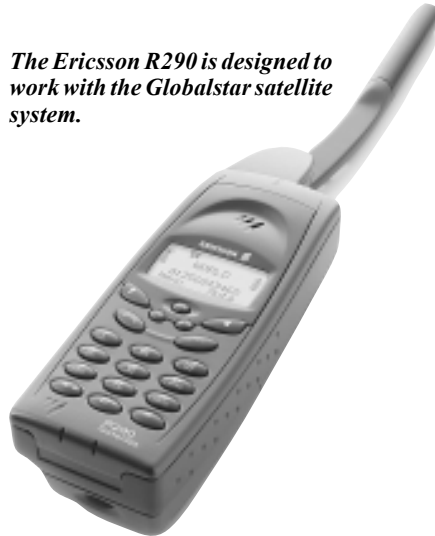
Satellite handsets typically support several air interfaces and frequencies, allowing a subscriber to use one phone throughout the world over multiple cellular systems as well as on satellite-based networks.

### ■ Globalstar

The next Big LEO (low earth orbit) to enter the market is California-based Globalstar. Their \$3.3 billion system uses 48 satellites to communicate with both fixed and mobile users, linking them to terrestrial Global System for Mobiles (GSM) and Code Division Multiple Access (CDMA) cellular networks.

Globalstar announced a "phased roll-out" of their service on October 11, 1999. Nine operational gateways provide service to "friendly users" in a dozen countries around the world. Full commercial voice service is expected in early 2000, with 9600 bit per second data and facsimile later in the year. Handsets built by Qualcomm, Ericsson, and Telital will retail between \$1000 and \$1500, while international calls will run anywhere from \$1 to \$2 per minute.

*The Ericsson R290 is designed to work with the Globalstar satellite system.*



Several technical issues distinguish Globalstar, although none of them may save the company from suffering the same fate as the earlier GMPCS entrant, Iridium.

	IRIDIUM	GLOBALSTAR
Coverage	Global	70 deg. North to 70 deg. South
Transponder Access Method	Proprietary Time Division	Bent Pipe Code Division

Perhaps the most significant technical difference is that Globalstar satellites operate as bent pipes, simply retransmitting a band of received frequencies back to the ground. Iridium satellites process signals on-board, making them useless for purposes the designers had not foreseen. Unlike Iridium, if Globalstar cannot make a go of their voice service they may be able to sell unused capacity to other companies wishing to rent L and S band transponders.

To keep construction costs down, Globalstar satellites are significantly smaller and less powerful than Iridium. Because of this, calls placed from portable phones may require two or even three satellites working together to complete a call. Using a process called *diversity combining*, handsets and earth stations assemble several relatively weak signals from different satellites into one strong signal.

More fundamentally, however, is the simple business question: is there a market for mobile satellite voice service?

Globalstar predicts they'll have 250,000 customers by mid-2000, and their business plan calls for three million customers by 2002.

Rivals Iridium LLC and ICO Global Communications, Ltd. are in bankruptcy, each having failed to generate sufficient confidence from the investment community. Iridium is in operation despite having relatively few customers, while ICO has yet to launch their first satellite. Iridium in particular suffers from poor management and an expensive, ill-conceived marketing plan, but all three ventures are essentially competing with terrestrial cellular service.

Each of these Big LEO systems was designed a decade ago, when cellular coverage was limited and prices were high. In the time it took to design, build, and launch these multibillion dollar systems, the terrestrial market lowered airtime costs, created inexpensive handsets, and built out coverage in most places where people travel. Whether there is a large enough market for mobile voice service via satellite remains to be seen.

### ■ Orbcomm

In contrast to the complicated and hugely expensive voice systems, Virginia-based Orbcomm has taken a different approach. Backed by Orbital Sciences Corporation and two other partners, Orbcomm provides a simple, low cost electronic messaging service via twenty-eight satellites in low earth orbit.

In April 1995, Orbcomm launched a pair of "microsats" to test the feasibility of an orbiting "store and forward" message system. These satellites were designed to receive a short electronic mail message during one part of their orbit and transmit it back to Earth in a later part of the orbit. Additional launches in 1997 and 1998 brought the constellation up to its present total of 28.

These satellites cannot process voice calls or high bandwidth messages, but the entire system cost less than \$500 million. As a result, Orbcomm can offer low prices to customers that need occasional, low band-

width communications for such applications as vehicle tracking, environmental monitoring, and equipment telemetry.

Several manufacturers, including Pioneer and Scientific Atlanta, build subscriber terminals, although Orbcomm is presently having difficulty generating revenue. As of June 1999, more than 116,000 subscriber units had been ordered, but only 11,000 were actually installed. Orbcomm hopes to have 50,000 units installed by January.

Orbcomm satellites weigh 95 pounds and fly at an altitude of about 500 miles, taking just over an hour and a half to orbit the Earth. For communicating with customers, each satellite contains one transmitter, typically operating at 20 watts, and seven receivers, each tuned to a frequency between 148 MHz and 150 MHz. Satellites transmit to subscribers via VHF radio links between 137 MHz and 138 MHz. Each Orbcomm spacecraft also has the capability of transmitting a UHF beacon at 400.1 MHz through a separate one-watt transmitter.

### ■ Monitoring Orbcomm satellites

Orbcomm satellites can easily be heard on most scanners and receivers capable of tuning in the 137 MHz band. The chart below indicates the frequency on which the corresponding satellites transmit. For those listeners interested in tracking these satellites via radio, John David Corby runs an excellent website at <http://www.hearsat.org> that contains updated information for many satellites, including the Orbcomm constellation.

Frequency	Satellites
137.2500	C1, C2, C4, C5, C7
137.4400	A3, A7
137.4600	F2
137.6625	A8, C3, C6, C8
137.6875	G1, G2
137.7175	A1, A2, A4, A5, A6
137.7375	B2, B3, B6, B7, B8
137.8000	B1, B4, B5

Because the Orbcomm satellites are in low earth orbit, they may only appear above the horizon for 10 or 15 minutes at a time. A satellite tracking program from the Radio Amateur Satellite website at <http://www.amsat.org> along with current satellite position information (called "elements," available from <http://www.orbcomm.com> as well as other sites) will allow you to predict which satellites will be overhead as you're listening.

Also keep in mind that because of Doppler effects of the moving satellite, the received frequency may not be exactly as depicted in the frequency table. The maximum Doppler for Orbcomm satellites is about 3 kHz.

### ■ Future of PCS

Personal Communications Systems will continue to evolve. The first generation of cellular telephones—the analog networks—are rapidly being replaced by a second generation of digital systems. The chart below indicates the percentage of wireless subscribers using each of these new technologies.

Technology	Worldwide Percentage	North American Percentage
GSM	44	4
TDMA/D-AMPS	6	27
CDMA	7	9
PDC	11	-
PHS	2	-
AMPS	23	60
OTHER	7	-

The goal of third generation (3G) cellular technology is to bring together terrestrial wireless, cordless, and satellite networks into a global standard. This initiative is called International Mobile Telecommunications-2000 (IMT-2000) and promises seamless roaming and higher transmission rates. Target dates for 3G include Japan in 2001, Europe in 2002, and other areas afterward. Build out of these advanced networks will probably occur in high population density areas first, gradually replacing earlier systems as customer demand warrants.

These new systems will also be linked to location reporting technologies, such as the Global Positioning System (GPS).

Other market niches for PCS will be found. One such area is prepaid wireless service, which is growing rapidly. Prepaid is a win-win situation: operators receive their money up front and incur little risk; subscribers control their costs, obtain service where they might otherwise be denied due to poor credit, and keep some anonymity.

Such anonymity, and the mobility that wireless service affords, does not sit well with law enforcement agencies, who wish to maintain their easy wiretapping capability. Expect legislation such as the Communications Assistance for Law Enforcement Act (CALEA) and various encryption

regulations to alter the services operators offer – and not to the benefit of the consumer.

It is also likely that prices for wireless service will continue to fall. Prices stayed high in the 1980s due to limited supply and a lack of competition, and held high in the 1990s due to a rapidly expanding market – lower prices were not needed to attract new customers. With more competition and fewer new customers, prices should drop much more rapidly in the coming years. Profit margins of 10 to 20 percent, enjoyed by such operators as AirTouch, Bell Atlantic Mobile, BellSouth, and SBC, should become a thing of the past.

And that's it for *PCS Front Line*. This is the last regular column to appear in *Monitoring Times*, as I make way for other topics requested by readers. I've enjoyed writing for *MT* these past three years almost as much as receiving electronic mail and letters from readers. I will continue to be available by e-mail at [dan@decode.com](mailto:dan@decode.com), and my website at <http://www.decode.com> will continue to have PCS, cellular, satellite, and other information related to communications technology. So for now, happy monitoring!

### Longwave Resources

✓ **Sounds of Longwave** 60-minute Audio Cassette featuring WWVB, Omega, Whistlers, Beacons, European Broadcasters, and more! \$11.95 postpaid

✓ **The BeaconFinder** A 65-page guide listing Frequency, ID and Location for hundreds of LF beacons and utility stations. Covers 0-530 kHz. \$11.95 postpaid

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# The End of a Chapter

I inherited this column from Rich Arland in July 1991 and rode it for nine good years. Unfortunately, the old adage struck home: "All good things must end." This will be my last column – at least for a while. It's a leave of absence that could become permanent.

I contracted an illness from which I am not expected to recover. The next few months will see me fighting tooth and nail in the battle of (and for) my life. But all is not hopeless. First and foremost, I believe in the power, the wisdom, and the glory of God. I also believe in miracles – both kinds: those of the Almighty and those of technology. I believe in the power of prayer, hope, and faith, and I believe in the power of hard work.

Armed with faith and creed, hope for a miracle, willingness to work, and buoyed by your thoughts and prayers, I am satisfied that the battle for my life will be fair and square. I can't predict the outcome, but I've already achieved second best! Nicholas Dandolos (aka Nick The Greek), an influence in my early years, once said: "To have played and won is the very best. To have played and lost is second best. To not have played is utterly the worst." I played.

But who knows? With your prayers and thoughts, this game might not be over! Onward....

### ■ On a Related Note

Endings and beginnings are synonymous. While I don't know much about mine yet, I can tell you about another ending and beginning in the offing. For most of nine years, this column has been about radio-electronic experimenting. I think it is coming to an abrupt end as we know it.

### ■ History of the Era

Radio-electronic experimenting traditionally required various levels of skill and knowledge over a wide array of subjects: basic electricity and electronic theory, math, physics, properties of materials, mechanics, components, and of course, tools. Experimenters also had a smattering of knowledge of electronic circuits including power supplies, amplifiers, and filters. They also knew about of techniques and processes, circuit board building, critical layouts, isolation and shield-

ing, wiring, soldering, housings and enclosures. Electronic experimenters were well-rounded.

The paradigm changed for the better in the 1960s as transistors replaced vacuum tubes. Experimenting became safer, thanks to elimination of high voltages. It got cheaper due to smaller and lower cost components. Moreover, it got easier as simple circuits could be stuffed into a few cubic inches.

More favorable changes came in the 1980s when the transistor and other components gave way to the integrated circuit. Safety, cost, simplicity, and size were improved all the more, but there was another factor. Depth of knowledge became less important to the success of experimenting. Integrated circuits became "black boxes" to which the experimenter only had to connect a power supply and perhaps a specified input signal.

Experimenting had explosive growth in the mid-70s when Citizens Band radio hopped on the bandwagon. The bottom of the CB market dropped out in 1980, but VHF-UHF scanning was firmly entrenched on the experimenter scene by 1986.

Ham radio and shortwave listening, the old stalwarts of radio-electronics, slacked off, however. Experimenting and circuit building had been a way of life in those circles before about 1970, but then super-hi-tech radio equipment arrived on the market. Competition skyrocketed to snare elusive and rare signals. Homebuilt and bargain basement equipment couldn't compete. Nevertheless, radio-electronic experimenting held its own until 1986.

### ■ The End of an Era?

1986 and the Electronics Communications Privacy Act (ECPA) heralded the government's entry into regulation of passive receiving! Before 1986, only transmitting had been regulated in the United States. The rather mild ECPA outlawed reception of cellular telephone signals, but it was an "Athlete's Foot" in the door that still stinks to this day.

The government gave itself a mouthful of teeth in 1994 with the Telephone Disclosure and Dispute Resolution Act. Parts of the TDDRA enabled the government to regulate the design and construction of monitoring equipment! The government then dictated

the capabilities and features of receivers. Furthermore, many do-it-yourself modifications were declared illegal.

The government required major portions of scanners to be inaccessible for experimenting and modification. Circuits were potted in impenetrable epoxies or other compounds. Scannists can't work on their own equipment any more.

To make matters worse, manufacturers joined forces to stop production of service manuals. So even if you can disassemble a scanner down to its bare circuits, you'll be hard pressed to find a schematic diagram and parts list for guidance.

To be sure, ham radios and perhaps shortwave radios aren't yet impacted by these severe regulations, but it could be a matter of time – an alarm for hams and SWLs?

The government now oversees even the kinds of circuits that experimenters can build, test, and operate. For example, the government says it is illegal to make the widely known and used simple "data slicer" or Hamcom Interface. The circuit consists of a 741 op-amp, four diodes, three capacitors, and three resistors, all sold by Radio Shack.

Before you holler, "They can't do that!" my wife and I were arrested and jailed for producing that very circuit. Yes, they can do that....and did. The case hasn't been resolved yet, but those who own or build "data slicers" or Hamcom Interfaces are in potential legal jeopardy.

If that no-brainer circuit can make criminals out of us, just imagine what hundreds of other experimenter circuits could do.... Worse, how do you tell what's legal anymore?

### ■ Long Term Effect

With CB radio and scanning highly over-regulated, two of the most popular areas of radio-experimenting are on the wane. As experimenters leave the hobby, hands-on technology goes with them, leaving behind populations of loose-knit, low-tech users. Radio-electronic experimenting will have gaping voids from which recovery may be impossible.

This isn't to say that scanning and CB Radio will fade away, although it's possible. But the *technologies* of the hobbies could slip away. If that happens, very different

hobbies will emerge to make the present and future compare like apples and oranges. Recall the early days of television (late 40s/early 50s) when the vanguard audience had to be hands-on just to catch a signal. Today, TV is a no-brainer.

The point is, radio-electronic experimenting is on the way out or at least changing, as we know it. Radio Shack's in-store parts inventories have been shrinking for years as their mail-order catalog grows. Radio and TV supply stores are becoming scarce. Even the simplest electronic projects can require mail-order purchases (and delays.) Experimenting is already less convenient; many parts are difficult to obtain in small quantities.

### ■ So What's to Come?

Just as resistors, capacitors, and transistors gave way to integrated circuits, I think discrete circuits will give way to ready-to-go "modules" and super-ICs, with standard connectors that plug into standard ports on computers and other appliances. See Radio Shack's 1999 *Catalog*, page 215, for elementary examples of what I mean.

I think more and more computer-ready products will emerge to open a whole new experimenter's turf. Less controversial experimenter areas (read unregulated) such as robotics, stereo/hi-fi, test and measurement devices, lighting, optoelectronics, remote control, alarm systems, etc., may actually take on added growth for a time. Today's radio experimenters aren't going to go belly up, they will just find something else to do.

The coming focus, however, will be computer and Information Age stuff, including connectivity via the Internet.

### ■ Here's a Hint !

Fer instance, wireless computer networking seems to be a coming thing. At ranges of 500-1200 ft per network transmitter, a neighborhood "club" could pool knowledge, costs, and resources to set up a private LAN with a high-speed shared connection to the Internet – cheap! Think about it – let your fantasies unwind. If your imagination is overtaxed, see these three sites:

<http://www.sohoware.com/Products/CableFREE.htm>

[http://www.webgear.com/aviator2\\_4\\_intro.html](http://www.webgear.com/aviator2_4_intro.html)

[http://www.microsoft.com/enterprise/1099\\_infra.asp](http://www.microsoft.com/enterprise/1099_infra.asp)



### ■ Conclusion

Electronic experimenting isn't going out any time soon, but the government dealt a heavy blow to radio-experimenting by regulating what can be monitored, regulating the design and specs of receivers and other monitoring equipment, and now, regulating simple passive circuits that can be built by home experimenters. Law-abiding citizens of a few years ago may now be common criminals. The impact could be enormous.

### ■ Quick Tip

The web site for the powerful ProTurbo control program for the CE-232 Scanner/Computer Interface has changed to: <http://members.home.net/pro-turbo/> The ProTurbo people can be reached by e-mail at: [lenc@cgocable.net](mailto:lenc@cgocable.net) or [pturton@iaw.on.ca](mailto:pturton@iaw.on.ca)

### ■ In Closing

Since I have to take an indefinite hiatus, the editor has requested I subject you to a brief biography. Born in 1945 and raised in Missouri, I got a portable AM radio for my 12th birthday and couldn't resist opening it. I poked one end of a 200-ft wire to various solder joints inside the rig. Shortly, I hit one that increased the volume. A bit of tuning brought in dozens more stations. Suddenly I was listening to HCJB in Quito, Ecuador, airing an Armed Forces Day program. I was hooked!

I spent 12 years in the Navy as an Electronics Technician, mostly in and around Vietnam. My specialty was the fledgling electronic surveillance field. My tools were "plants," "rocks," "animal droppings," and other devices that concealed miniature sensors and transmitters.

I left the Navy to avoid a Pentagon desk job after the war and spent the rest of my years near the leading edge of technology and raising four sons and a daughter. I started writing about radio in 1973 and went on to write for *S9/Hobby Radio*, *Popular Communications*, *Eleven Meter Times & Journal*, *World Scanner Report*, and *Monitoring Times*, as well as three books. Since 1989, I've been learning and applying computers and information systems. I haven't known a moment's boredom in over 30 years. It's been a good life!

Nowadays, my priorities include spending time with my wife and fighting my illness. There is little time for anything else, but then nothing else much matters. I trust that you'll understand and wish me well in whatever is to come. Happy monitoring and may God bless all!

#### Products that make the difference !

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#### High Performance MW Loop Antenna

Award winning antenna. Tunes 530 to 1700 kHz with features unlike any other antenna including regeneration and 3 to 1 gear reduction drive!

#### Pocket Loop Antenna + PRM

Air-core loop antenna that collapses to fit in your pocket. Ideal for portables and travelers. Tunes 530 kHz to 23 mHz. The PRM (P.L. accessory) provides regeneration to >10 mHz.

#### BCB Rejection Filter

Ideal filter to eliminate BCB interference.

#### Shortwave Preamp

Extremely low noise and high immunity to overload (ip3 = +34 dBm). Includes BCB rejection filter. 10 dB gain 1.75 to 30 mHz.

#### Broadband Preamp

Same high performance as the SW Preamp but without the BCB rejection filter. Response: 100 kHz to 30 mHz. 10 dB gain

#### Earth Monitor

ELF receiver that receives 50 Hz to 15 kHz. Hear tweaks, whistles, dawn chorus and other natural radio signals from planet Earth!

#### IF Filters and Receiver Upgrades

455 kHz and now 430 kHz IF filters! Receiver upgrades maximize performance!

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[kiwa@worldnet.com](mailto:kiwa@worldnet.com)



509-453-5892 or 1-800-398-1146 (orders)  
FAX: 509-966-6388

# The Popular Half-wave Antenna

**H**alf-wave antenna designs are the most popular designs used in high-frequency work. There are reasons for this; they are inexpensive, easy to construct and erect, and work well. This month let's explore several different kinds of half-wave antennas and the differences between them.

## ■ The Center-fed, Half-wave Dipole

The most common antenna design of all is probably the half-wave, center-fed, horizontal, dipole antenna (fig. A). When mounted at practical heights above ground, the nulls off the antenna's ends are shallow, and thus the antenna is relatively nondirectional. Mounted a half-wave above electrical ground a horizontal half-wave gives good low-angle vertical radiation to support DX communications. At a quarter-wave high it gives more higher-angle vertical radiation which supports close-in communication. As with all half-wave antennas the dipole has sufficient gain to support communications in a wide variety of applications.

The feedpoint impedance of half-wave antennas at practical distances above ground varies with height above ground. When fed at the center the feedpoint impedance is relatively low; 52-ohm, 72-ohm, or even the somewhat higher impedance values of coax usually provide an acceptable match as the antenna's lead-in.

The environment in which the antenna is situated also affects the antenna's feedpoint impedance and its resonant frequency. In some applications the use of a matching device (stub, gamma-match, etc.) gives a useful improvement to the match. Baluns for coupling the balanced antenna to the unbalanced coax are sometimes useful.

Unless a broadband design is used, dipoles employed on the lower frequencies of the HF band typically cover considerably less than the full band for which it is designed. When multiband operation is desired, multi-element (fan-type) dipoles are available, as are trap-loaded multiband dipoles.

When mounted in the shape of an upside-down letter "V" a center-fed, half-wave dipole is called an "inverted-V" antenna. In this configuration the vestiges of nulls in the antenna's radiation and reception pattern are even less in evidence than with the horizontal dipole, and the antenna is essentially nondirectional.

Half-wave dipoles are also often mounted in a sloping manner, and are known as

"slopers." The resulting antenna is directional in the direction toward which the antenna slopes downward.

## ■ Folded Half-wave Dipole

When greater bandwidth is desired, another half-wave dipole antenna is often useful: the folded dipole. This antenna is made of two dipoles connected together at their ends (fig. 1B). The characteristics of this antenna are very similar to the ordinary, half-wave, dipole antenna except that its center feedpoint-impedance is four times as high, and its bandwidth is significantly broader.

## ■ End-fed, Half-wave Dipole

Half-wave antennas needn't be fed at their center; they may be fed at any point along their length. When fed at one end the antenna presents a very high feedpoint impedance.

Various matching devices can be utilized for end-feeding of a half-wave dipole. One technique, the Zepp-fed half-wave, uses a quarter wavelength of open-wire feedline for this (fig. 1C). The quarter wavelength of feedline transforms the high impedance of the feedpoint to a low impedance at the end of the line away from the antenna.

Another matching device for end feeding a half-wave utilizes a parallel-tuned RF circuit. A coax line is tapped across a few turns – or even less than one turn for large-diameter coils – at one end of the coil of an capacitor-induc-

tor tuned circuit. This provides a match for the coax's low impedance. Then the end of the antenna is attached much farther up the inductor, perhaps even at the coil's other end, to obtain a good match for the high impedance of the feedpoint.

End feeding a half-wave antenna does change its radiation and reception pattern a bit, but not dramatically.

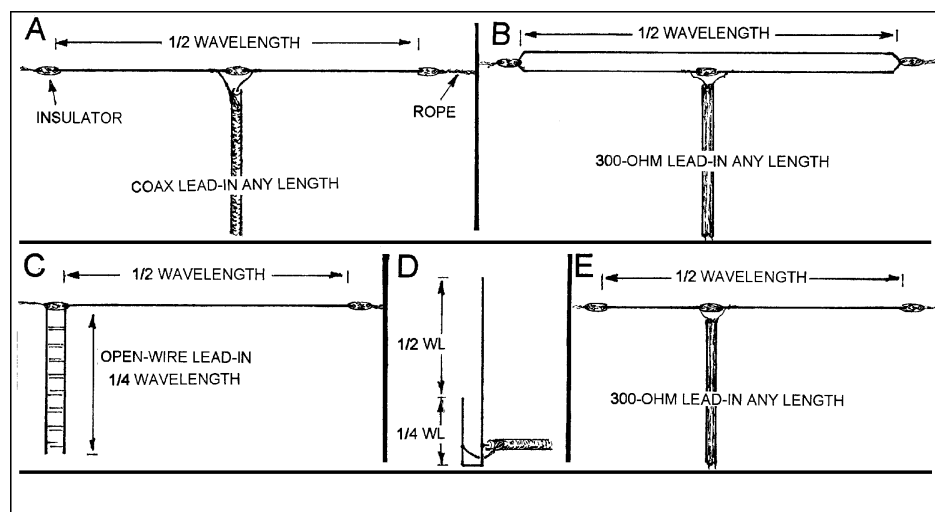
## ■ J-Half-wave

If we take a Zepp-fed half-wave as mentioned above, and orient the half-wave element so that it is vertical rather than horizontal, we have what is known as the "J antenna" (fig. 1D). If we then short the open end of the feedline, the impedance presented by the feedline varies from near zero at the short to quite high at the non-shortened end. It is then possible to connect a coax feedline at an appropriate point along the length of the feedline to obtain a good match for the coax feedline.

## ■ Off-Center Fed

We mentioned above that a half-wave antenna can be fed at any point along its length. The impedance of the chosen feedpoint will vary from low at the antenna's center to a progressively higher impedance as the feedpoint is chosen farther away from the center toward either end. One off-center fed design is the Windom antenna (fig. 1E).

Although we're out of space there is much



**FIG. 1.** A simple half-wave dipole (A), a folded dipole (B), a Zepp-fed half-wave (C), a J-antenna (D), and a Windom antenna (E).

more that could be said about half-wave antennas. Maybe we'll get to some of that another time.

#### ■ Correction

Thanks to George Hagn for pointing out that for fig. 1B in my September column, response of the groundplane antenna below 30 degrees should *decrease* rather than increase as shown in the figure.

### ❁ RADIO RIDDLES ❁

#### ■ Last Month:

I said: "Long ago radio engineers developed various means of having audio-frequency (AF) signals, such as voice or music signals, impressed upon radio-frequency (RF) signals. This is accomplished by what is called 'modulating' the RF signal with the AF signal. When you listen to a radio program the program (AF) which you hear reached your receiver as modulation on an RF signal which 'carried' the AF through space to your antenna. The AF was then separated (detected) from the RF to produce the AF programming.

"Audio-frequency signals such as those flowing in the amplifier, speaker, or earphone

circuits of your cassette player or CD player are electromagnetic phenomena. And, in fact, if you were to connect these signals to an appropriate antenna they would be radiated as electromagnetic waves in the same way that radio-frequency (RF) signals are radiated.

"Why then do we modulate an RF signal with the AF signals when what we want to transmit is the AF? Why not just transmit the AF directly rather than going to all the trouble of modulating it onto a carrier at the transmitter, and later demodulating it at the receiver to get the AF back?"

Well, we theoretically could transmit the AF directly, but the antennas required would be far beyond the practical limits of what we can build. An antenna with a useful level of efficiency for such extremely-low frequencies would be enormous! In the audio range, a frequency of 1 kHz has an RF wavelength of over 186 miles! A half-wave, quarter-wave or even a one-tenth wave antenna would just be too big to construct.

I believe that this is why Hertz, when asked if the electromagnetic waves he had discovered would ever be useful for communications, replied to the effect that they would not. He said that this was because it would require a mirror as large as a continent. He was no

doubt thinking of using an antenna with a parabolic-reflector (a mirror to his waves), and using it to transmit audio signals directly. He had used parabolic reflectors for RF transmissions in his laboratory where the much shorter RF wavelengths made this practical.

Actually, audio frequencies as well as RF frequencies are transmitted directly by lightning bolts which act simultaneously as spark-gap transmitters and antennas. The resulting radio waves in the AF range traverse the earth providing interesting listening known as "the dawn chorus," and "whistlers." These may be received in very electrically-quiet locations by nothing more than a high-gain audio amplifier, a short antenna, and a ground!

#### ■ This Month:

There are antennas called "phantom antennas"; their name sounds as if they are unreal, or no antenna at all. Then there are "Real McCoy antennas" which sound like they must be very real antennas. Just what are these real or unreal antennas anyway?

You'll find an answer for this month's riddle, and much more, in next month's issue of *Monitoring Times*. Til then Peace, DX, 73 and Happy Holidays!

# NEW!

## ACTIVE DUCK ANTENNA BRINGS WORLDWIDE RECEPTION TO YOUR HANDHELD SCANNER!

If you are the owner of a wideband, handheld scanner like the ICOM R1, R2, R10, AOR AR8000, 8200, 16, 16B, or Alinco DJX10T, you know how difficult it is to hear shortwave or even medium wave broadcasters on the little antenna. Now you can enjoy considerably improved reception below 30 MHz with Grove's exclusive "Active Duck," a high performance, low profile, amplified antenna system.

Simply substitute the "Active Duck" for your original flex antenna, and listen to distant countries come booming in on your wideband handheld, and enjoy domestic AM broadcasters like you've never heard them before! Battery included. (See review on p. 104 for details)

# GROVE

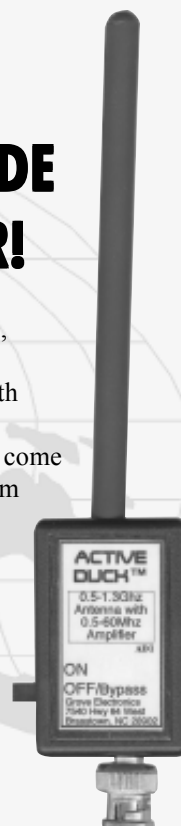
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# Hamming on the Internet

For about a year now, I have been actively looking on the internet for ham radio sites. I have found several that I especially like, and would like to pass them on to you.

## ■ The ARRL on Line

[www.arrl.org](http://www.arrl.org) is the best ham radio site on the internet. There is just about anything you need available at this site. An online classified section provides a rapid and convenient way of swapping/buying gear. Propagation reports and DX happenings are kept up to date, as is general news of what is going on in ham radio.

I also like the construction articles that appear here; most are very simple and useful. For example, recently an article on building a discone antenna appeared on the site. I promptly duplicated the antenna and am very happy with it; cost was under ten bucks and it works extremely well.

A section called Members Only provides up-to-date info directly to your e-mail address on late breaking news, Klepperian data and hot DX news. In addition extremely detailed news is available in this portion of the site. Members Only allows you to detail the information you want sent to your e-mail box.

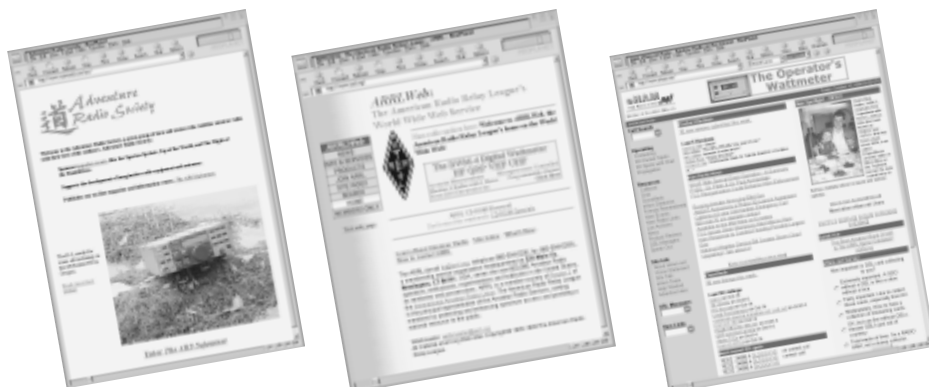
I find this electronic news letter very convenient; in fact it alone is worth membership in the ARRL. If you are an active amateur and on the Internet, then you should be checking this site out often!

## ■ Amateur Radio on the Internet

[www.eHam.net](http://www.eHam.net) is the address of this neat site. One feature that is really great is a section of reviews in which users of various gear can review the gear for others. A lot of good information is available here, so if you are interested in a particular piece of gear check this site out.

Free ham ads are accepted here and really bring results fast. I sold several things via the ham ads at this site, and usually my ad did not run for more than two or three days.

A ham radio chat group is also on this site. I have chatted with hams in a lot of places using this group; one night a VU2 joined us for a rag chew. A lot of DX does hang out on this site. The chat groups are "general ham



chat," "DX" and "looking for on air contact."

Another portion of this site allows you to present a viewpoint to others and receive their input, and of course you can reply to others.

Amateur radio news, DX, propagation are all part of this site. In addition, the site features various hams on a weekly basis (was happy to see my friend K3ANS featured one week).

After trying this site, you will become a regular visitor.

## ■ Home Brew Antenna Pages

Like antennas? Then you must check out AC6V's site. I'm not sure how many different antenna sites/pages are here, but there are enough to keep you busy for years.

Everything from simple wire antennas to complex high gain arrays are presented at this site. I look these pages over at least twice a week. I have gleaned a dozen or more ideas from the material presented. Some of the information is a little sketchy, but in general there is enough to work with.

Without doubt the average ham could save hundreds if not thousands of dollars by checking out these pages and homebrewing their own antennas.

Address is [www.ac6v.com/pageant](http://www.ac6v.com/pageant)

## ■ Adventure Radio Society

Here is a site for those with a spirit of high adventure. The ARS encourages operation from places that can only be reached by human power (foot, bicycle, canoe or any other nonpowered means).

Some members operate from very interesting wilderness locations. Of course this is a QRP club and all members run low power

during their outings. Look for N3IK from Lehigh Gap State Park on the first day of spring. (For this adventure you should be bicycling.)

Short monthly contests called "sprints" keep members happy. The ARS has an online newsletter called *ARS Sojourner*. Each month news, interesting commentary and ideas provide interesting reading and promotion of activities.

If you are a member of ARS, you will receive e-mail prior to each sprint, and frequent "wilderness alerts" – notices to other members that you will be operating from a wilderness site (date, time, freq etc.).

If you would like to check out ARS, their address is [www.natworld.com/ars/](http://www.natworld.com/ars/)

## ■ AM Frequencies

Here is a list of where you can find AM operation on the ham bands.

**160 meters:** 1885, 1900, 1945, 1985.

**75 meters:** 3825, 3880, 3885.

**40 meters:** 7175, 7290, 7295.

**20 meters:** 14286.

**17 meters:** 18150.

**15 meters:** 21285.

**10 meters:** 29000 - 29100.

**6 meters:** 50.4

**2 meters:** 144.4, 144.28 (NYC-Long Island).

## ■ Propagation

If you have not been working DX, you have not been on the air! Every band has been hopping with DX from all over the world. This winter should be the best DX season in a long time. Solar flux has been up around 200 most days and climbing.

That's all for December, Happy Holidays to one and all, 73 de Ike, N3IK



## Cobra's Innovative MicroTalk Weather

**G**eorge Carlin had it right: "You nail together two things that have never been nailed together before, and some schmuck will buy it from ya." So, from the get-go, there's a certain inevitability to what I'm about to tell you.

Steady readers know this column has heavily covered Family Radio Service (FRS) equipment. That's because FRS is one of the neat developments in the world of two-way radio in the past few years. For newcomers, FRS is a license-free two-way radio service based on 1/2-watt (maximum) handtalkies operating in the 460 megahertz range.

There are 14 FRS channels, on the following frequencies:

Channel	MHz
1	462.5625
2	462.5875
3	462.6125
4	462.6375
5	462.6625
6	462.6875
7	462.7125
8	467.5625
9	467.5875
10	467.6125
11	467.6375
12	467.6625
13	467.6875
14	467.7125

There are at least 42 companies involved in manufacturing and marketing FRS equipment, and sales across the country are rolling along at a brisk pace. There are good reasons for the popularity of FRS: in general, the tiny handtalkies work well. They deliver clear communications over short distances (manufacturers claim a maximum of two miles under ideal conditions, although real-world range is often less). In addition, manufacturers keep adding new features while the price of low-end units, at least, keeps dropping.

Regular readers also know that I am a huge fan of the NOAA (National Oceanic and Atmospheric Administration) Weather Radio system, which broadcasts National Weather Service warnings, watches, forecasts and other hazard information 24 hours a day. There are more than 480 NOAA Weather Radio stations in the 50 states, Puerto Rico, the U.S. Virgin Islands and U.S. Pacific Territories. Most of the stations have a range of about 40 miles.

To listen to these Weather Radio broadcasts, you need a radio that can receive 162.400, 162.425, 162.450, 162.475, 162.500, 162.525, or 162.550 MHz. The information provided by these broadcasts is invaluable and can save lives if people pay attention. In my opinion, of the many things that our tax dollars purchase, NOAA Weather Radio is surely one of the most worthwhile.

### ■ FRS plus Weather Radio

Now, having said all that, imagine my glee when I discovered that Cobra Electronics has recently brought to market an addition to its worthy MicroTalk line of FRS transceivers – the FRS 310 WX. This handsome 14-channel FRS radio is tricked out with just about all the goodies that you might want, including a weather-resistant gasket around the battery compartment, plus the ability to receive weather channels.

The 310 WX offers 1/2-watt transmit power (the legal limit); a "call" button, a talk confirmation tone (Roger Beep) and operates on four AAA batteries. Weighing just six ounces, it measures about 4 inches by 2.5 inches by 1 inch with the antenna flipped down.

On the front of the 310 WX, there is a backlit liquid crystal display that tells the user what's going on with the radio and six buttons: LOCK, ENTER, FUNCTION, CALL, and a pair of UP/DOWN slewing buttons. Also on the front of the radio there is a grill for the speaker and microphone.

On the left side of the case, there is a push-to-talk button, a button that turns on the display light and turns off the auto-squelch and the flip-down antenna. On the top of the case, there is a gasketed opening for plugging in an optional speaker-microphone and other accessories and an ON/OFF/ volume knob. On the back of the case, you'll find a removable belt clip and a hatch for accessing the battery department as well as contact points for an optional drop-in battery charger. On the right side, there is a nylon wrist strap.

The 310 WX offers a wealth of goodies: 38 CTCSS (continuous tone coded squelch system) tones that can be used to block unwanted transmissions, voice scrambling to make conversations more secure, and the capability to vibrate or ring on incoming calls. In addition, there are ten memory channels with the abil-

*Cobra's MicroTalk 310 WX delivers great FRS performance, plus Weather Radio reception.*



ity to scan them, the capability to scan for active FRS channels and to find CTCSS tones. The latter is handy if you need to communicate with someone who has CTCSS tones activated, but you don't know what they are. The 310 WX also offers dual watch capability, which allows the monitoring of two different channels. There is also a battery-saver circuit and a low battery indicator.

Of particular note is the manual for the 310 WX. It is well written and clearly laid out. It is divided into two sections: basic operations and advanced features. It even takes care to point out some of the great uses of FRS, such as communicating between floors of a house, staying in touch between cars on a trip, or keeping track of kids at a mall.

The performance of the 310 WX is just what we've come to expect from the MicroTalk line: crisp, clear and full range. The reception of Weather Radio channels is excellent as well. Thumbs up to Cobra for a job well done!

Accessories available for the 310 WX include speaker-microphones, a voice-operated headset, a belt holster, and rechargeable nickel metal hydride battery packs.

The suggested retail price of the MicroTalk FRS 310 WX is \$159.95, although Grove has it at \$50 less. For more information, visit Cobra's website [www.cobraelec.com](http://www.cobraelec.com) or call Grove at 800-438-8155.

# The Better Side of the Internet

Last month we saw how dreadful using the Internet could be, buying from our friendly gulf of Florida on-line computer merchant. This month, we'll get back to the better side of the Internet, and all the great things the "net" can provide.

A few months ago, I contacted Samsung after I read about a new product called Jet Radio in a trade magazine. Jet Radio is sold by Samsung as part of a package called Jet Audio Plus. Windows 95/96 is required, along with a Pentium 166 MHz and a 16 bit sound card. This product is actually produced by Cowon ([www.cowon.com](http://www.cowon.com)).

Jet Audio is a very nifty, all-in-one, media player for audio CDs, DVDs, digital audio and video files and Internet files. Its multi-band audio equalizer "recorder" capabilities are very useful for monitors who want to make digital recordings of their intercepts. But my main interest was in Jet Radio.

## ■ An Internet Radio?

With the advent of RealAudio, and other audio streaming formats, Internet users can "tune-in" to radio stations who stream their programming on the Internet, while sending it out over the airwaves. Local radio stations from all over the world, as well as traditional shortwave stations, are taking advantage of this new QRM-free medium. Today, the number of radio stations with some form of Internet content runs into the hundreds.

Listening to them requires a decoding program for the format that is used. At this time, RealAudio is the most used format.

So listening to your old shortwave favorites, such as BBC, on the Internet is as easy as finding their website and then clicking on the "Listen To RealAudio Programming" button. But with hundreds on the Internet how does one keep track of all the addresses?

## ■ Enter Jet Radio

The Jet Radio program's operation is analogous to a shortwave station logging, database and receiver tuning program. Figure One shows the main screen of Jet Radio version 1.5. It comes loaded with a RealAudio "engine" and the addresses, URLs, of stations streaming RealAudio content. Jet Radio can only "receive" RealAudio format "stations"; which is the majority of those found on the Internet today.

## ■ Click "Tuning"

Although Jet Radio comes with a database, the rapid, daily changes occurring on the Internet requires frequent updates. Gone are the days of a station occupying one "frequency" for decades and only alternating between "their" summer and winter set

of frequencies. On the Internet, stations come, go and move their address (URL) frequently.

For most, this is a result of the rapidly evolving Internet technologies. But for some stations the cost/return ratio is not yet where it needs to be for a profitable use of this medium. These stations try it for a short period and then leave the Internet "air." As (if) the Internet broadcast medium becomes more of a mass media entertainment outlet, these stations will return.

The Cowon site provides occasional updates of stations that can be downloaded free of charge. The list, which we have loaded in this version of Jet Radio, has international stations listed by country. The stations are arranged in libraries according to content. These can be changed to suit each person's listening preferences. Users can regroup, add, delete or update stations' addresses.

## ■ "This is the (Internet) BBC"

Figure 1 displays Jet Radio's first screen of [International] UK - England stations. Our cursor is on one of the "tuning" buttons. This one selects "BBC World Service" Latest Pre-Recorded news program. Not all stations broadcast "live" programming. BBC has a number of Internet stations. The "station" stored at this button of Jet Radio happens to be a prerecorded program site.

In Figure 2, we have clicked on KISS-FM (London) and we are listening to live programming. Notice that the top of the display has come alive with information. The station name (KISS-FM) is now displayed along with the data rate of its programming. The higher the data rate, the greater the potential for wide frequency audio - good quality sound. The number in the top left corner is the channel number of



**FIGURE 1** - Jet Radio's "Database" of International Stations



**FIGURE 2 – Jet Radio “Tuned” to KISS-FM (London) – Live**

KISS-FM in our UK database.

Above the tuning button, and just below the station name, is an area of useful displays. The display at the left illuminates when a station is “on air”; meaning the Internet address which you have accessed contains RealAudio programming.

The display to its right, labeled “buffer,” is the bane of Internet listeners. It is the Internet equivalent of the adjacent channel interference, jammers and QRM (interference from other stations). Well, not really – but it almost has the same detrimental effect on Internet monitoring. When the station (site) is first accessed the computer stores some of the received data (program content) in RAM. This data is manipulated in order to produce audio (or in some cases, video). Because the manipulation takes time, data is stored, or buffered, before it is converted to audio.

### ■ Internet QRM

If the data from your modem is disrupted due to noise on the line, Internet congestion, your Internet company’s equipment

limitations or your computer’s limitations, then the buffer light comes on to indicate that the data flow is not smooth. If this situation is not corrected within 15 seconds, the audio becomes choppy and broken-up. However, unlike radio transmissions, the audio is not lost during these “events,” only delayed. It’s bothersome when listening to music, but still not quite propagation fading or second station interference whistles!

The next display illuminates if the programming is in stereo. Next to this is the “Live” display, the one I find the most useful. Here, we can determine if the programming is prerecorded or live. As you can see, KISS-FM is broadcasting live programming.

Don’t be fooled by the 100.0 MHz, or the FM display. They are user programmed and are not very important. For a minute, I felt right at home in front of a real radio receiver. Oh well.

### ■ Alternative Internet “Tuners”

There are other products, which function similarly to Jet Radio. In fact, if you download a separate RealAudio player from their website ([realaudio.com](http://realaudio.com)) they provide a “favorite” stations section. However, Jet Audio is much more flexible and convenient to use. To me, it just feels more like a shortwave radio logging, database and control program.

### ■ Before You Start

Samsung’s Jet Audio Plus includes Jet Audio version 4 and Jet Radio version 1. However, I strongly recommend that you visit [www.cowon.com](http://www.cowon.com) for the latest updates to both of these programs before you use them. I had no success using Jet Radio version 1.

In fact, after I installed the station list update, version 1 stopped functioning com-

pletely. Once I downloaded the updated version of Jet Audio (v4.5), and then downloaded the 4.5 to 4.6 upgrade, I had a working Jet Radio version 1.5. Then the station update worked fine. Be aware that one of these files is 6 Meg in size and takes quite a while to download. Jet Audio Plus is available from CompUSA, Best Buy, MicroCenter, Office Max and Staples at a retail price of \$44.95.

### ■ The 21st Century

Like everything in life, there is a good part and a bad part to the Internet. The duality of the Internet and life: You gotta love it!

When we get together next time the Y2k bug and the coming of new millennium will either be laughable, misconceived notions of the 20th century, or . . .

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## Uniden BC248CLT Scanner

**W**e reviewed a Uniden BC278CLT clock radio scanner in the November column. Able to fit on the smallest of night tables, the '278 was the first Bearcat scanner to provide an alarm clock feature and cover the AM and FM broadcast bands and the conventional scanner bands. Concurrent with the BC278CLT, Uniden is marketing the lower cost BC248CLT (Fig. 1). The similarity in their cases belies significant differences inside.

The Uniden Bearcat BC248CLT is a 50-channel, double conversion scanner manufactured in the Philippines. That's half as many memories as the BC278CLT. Both models are designed for base use only, and are powered by the same 10 VAC wall transformer (supplied).

The frequency coverage is 520 - 1720 kHz, 88 - 108 MHz, VHF-low, VHF-high, and UHF land mobile bands. The upscale BC278CLT tunes the civilian air and 800 MHz bands, but the BC248CLT omits them. A 7-inch loop antenna (Fig. 3) is provided with both models for AM/BCB reception and its feedline attaches to a 2-pin connector on the rear panel.

### ■ Memory Features

There are 50 programmable memory channels, organized in five banks. Each channel can be locked out from the scan list, and a 2-second rescan delay is selectable on a per-channel basis. Empty channels are skipped automatically, and channels containing duplicate frequencies are detected. Uniden claims the memory information is backed up indefinitely, but the clock must be reset after a substantial power failure. As with the BC278CLT, the time "stood still" when we unplugged the scanner for 2 minutes or so.

AM and FM broadcast band frequencies are allocated in separate 10 channel banks and they cannot be programmed using the numeric keypad. AM/FM frequencies must be programmed like a car radio instead. You are constrained to tuning up or down the band and pressing E to save the displayed frequency into memory. It would be much simpler if you could program your favorite country music station by pressing 104.3 E, for instance, but you cannot.



**FIGURE 1.** *Uniden BC248CLT combination scanner and clock radio*

### ■ Scan Yes, Search No

The BC248CLT may be used as a scanner or AM/FM radio, but not both at the same time. You can scan any combination of the five VHF/UHF memory banks. The scan rate is half the speed of the BC278CLT and our BC248CLT scans at only 11 channels/sec. The scan rate is not unreasonable for a radio with few channels. One channel per bank may be designated as a priority channel, which is sampled every 2 seconds when priority scanning is enabled.

Most of us expect a scanner to provide a limit search facility, but the BC248CLT does not. The higher price BC278XLT includes both limit and service search features.

Pressing the WX key causes both models to search seven preprogrammed NOAA weather frequencies.

If the weather alert feature is active, both models sit silently until the NWS (National Weather Service) transmits the proper signal, which causes the scanner to beep and open the squelch. The NWS can broadcast messages to specific geographic regions by transmitting the appropriate SAME (Specific Area Message Encoding) codes. You can arm the BC278CLT by programming SAME codes, but the lower cost BC248CLT does not support SAME.

### ■ The Exterior

The BC248CLT and BC278CLT look like twins. Each is housed in a dark gray plastic cabinet. The speaker and all controls are mounted on the top, at a slight angle. The large knobs are finger friendly.

The large LCD display requires no squinting. The display is brightly lit in soft green in scan, manual, and weather modes. In other

modes, the backlight remains bright for 10 seconds, then reverts to dim illumination. Pressing any key will temporarily force the backlight back to bright.

Large, soft rubber feet prevent the BC248CLT from sliding around. While the BC248CLT and BC278CLT look similar from the front and top, they use different antenna connectors. The BC278CLT sports a BNC jack. The BC248CLT incorporates a low cost "Motorola-type" jack—an anachronism found in scanners sold when disco music was popular. A plastic lip below the jack prevents using an SO-239 adapter. You must either file down the plastic lip or use a bench grinder to alter a metal adapter as we did (Fig. 2).

### ■ Performance

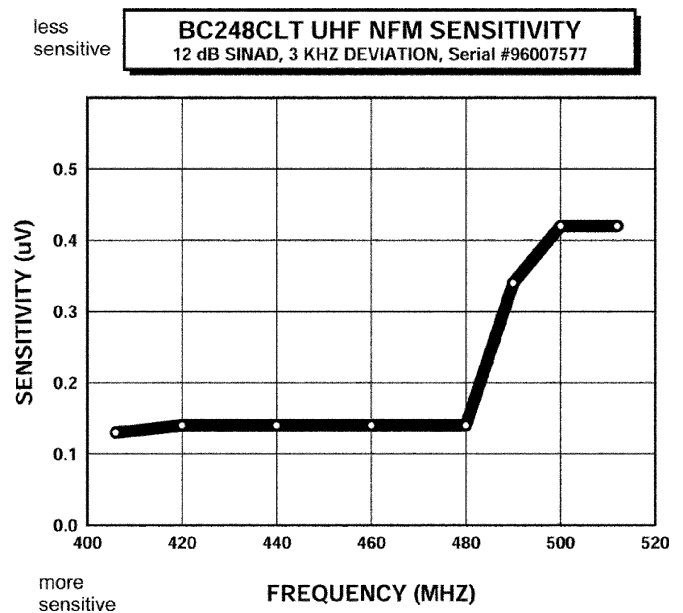
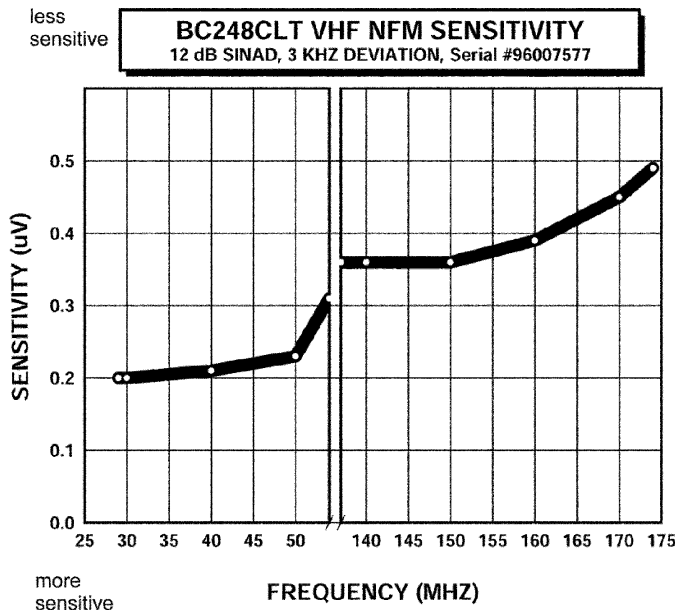
The loaner BC248CLT (s/n 96007577) works well. We measured several performance parameters and the quantitative results appear elsewhere in this review.

The double conversion BC248CLT and BC278CLT share a 0.45 MHz 2nd IF, but they have different 1st IFs—21.4 MHz and 10.85 MHz, respectively. Though the BC248CLT uses a higher 1st IF, our BC278CLT rejects images better at our 155 MHz test frequency. The sensitivity, modulation acceptance and audio output of this BC248CLT are quite reasonable. The BC248CLT has no limit search, so we didn't hunt for birdies.

A rear mounted 1/8" jack permits connection of an external speaker, but you won't



**FIGURE 2.** *Female UHF to Motorola plug adaptor modified to fit BC248CLT (top). Unmodified adaptor (bottom)*



need one. Audio from the top mounted, 2 watt speaker is pleasant, with sufficient treble.

The weather alert feature worked as advertised during the weekly NWS test transmission.

### Overall

Low cost (\$119.95 from Grove Enterprises) doesn't have to mean poor performance. In this case, it simply means fewer features. Our BC248CLT sounds good and performs well, but its frequency coverage and feature set is quite limited. It would serve someone with simple needs, e.g., a businessman who needs to monitor his VHF tow truck fleet or a resident who enjoys listening to the fire department and doesn't want to search for new frequencies.



**FIGURE 3.** Supplied 7-inch AM loop antenna (base stand not shown)

## MEASUREMENTS UNIDEN BC-248CLT SCANNER S/N 96007577

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88 - 108 (100 kHz steps)  
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137 - 174 (5 kHz steps)  
406 - 512 (12.5 kHz steps)

Sensitivity:  
see graphs

FM modulation acceptance:  
12 kHz

Intermediate Frequencies:  
21.4, 0.45 MHz

Image rejection:  
35 dB at 155 MHz

Audio output power at speaker jack:  
780 mW @ 10% distortion into  
8 ohms

Practical memory scan speed:  
11 ch/sec.

Search speed:  
No search capability

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## RECENT DISCOVERIES ABOUT LIGHTNING

It was previously thought that if you were at least 3-4 miles away from lightning flashes, you were safe. Now it's been shown that successive lightning flashes may be as widespread as 5 miles, so you must be at least 6-8 miles away to be relatively safe. Since thunder travels at about one mile every five seconds, that means that if you hear it in less than a half minute, it could strike next near you.

Many cloud-to-ground lightning flashes have forked or multiple attachment points to earth – at least half of negative flashes and more than seventy percent of positive flashes. And once the bolt hits the earth, it can spread or even arc in a 60 foot radius, depending upon soil conditions.

Lightning protection systems are only partially effective. In lightning-protected rocket-launching pads, current traveled through rebar, concrete, pipes, cables, vent stacks, and electric wiring.

**Q. Where does the year 2000 first begin, on the International Date Line or the Prime Meridian (Greenwich)? And how about the jog in the International Date Line around the Bering Strait, Aleutian Islands, Samoa, and Tonga? (Bob Schultz, KCOFBB, St. Louis Park, MN)**

**A.** According to a spokesman from the Time and Frequency Services (station WWV) of the National Institute of Standards and Technology (NIST), the International Date Line is the primary reference. When it's 0000 (Local Standard Time) on January 1<sup>st</sup> there (the same

as 1200 UTC, December 31, 1999 at Greenwich Observatory), Earth has officially entered the new year.

While it's true that some of those remote areas may be seeing sunlight before others, regardless of the shape of the International Date Line, if you're west of it, you get to celebrate the new year first!

**Q. I recently saw an ad that said you should replace your car battery with a larger one because the resistance of the car's wiring increases with age. Is this true? (Mark Burns, Terre Haute, IN)**

**A.** It's absolute bunk! Discounting resistance from corrosion (which is a defect, not a natural condition) the life expectancy of the wiring is far greater than that of the car. And even if it were true, all standard automotive batteries provide 12 volts regardless of size; you would need higher voltage for increased resistance. The larger batteries simply deliver more amps (current) when connected to lower, not higher, resistance.

**Q. Why do commercial telephone systems use negative 48 volts?**

**A.** An interesting item in the October 15 issue of the *W5YI Report* explains this curiosity. Phone company exchange offices utilize rechargeable 12 volt batteries, and four of these batteries (48 volts) supply the safest high voltage unlikely to

be a shock hazard, while still overcoming line resistance. It is negatively polarized to retard galvanic corrosion of the connectors.

**Q. If a telephone line in the home is spliced, can someone else use your line? (Tony Currin, Dillon, SC)**

**A.** Absolutely. While common telephone cable has four conductors, the red and green are the "hot" wires. Tapping those with another phone is exactly how an extension is wired.

**Q. Even if I disconnect my antenna connector from my radio during a storm, can't the spark jump to a nearby metal object? (Glenn Greenwald, Fall River, WI)**

**A.** It certainly can, especially if that metal can provide a path to ground, like a nearby radio plugged into the wall! An old trick that hams have done for decades is to remove the connector a reasonable distance from the equipment, then stick that connector down to the bottom of a drinking glass so that the spark path would have to be even longer to form an arc.

It may be desirable instead to provide a grounding block to which connectors may be attached during a storm, thus requiring the surge to go directly to ground rather than look for a path to jump.

**Q. How can I increase conductivity of my soil around my ground rod without corroding the copper rod? (E. Sasko, Scarborough, Ont.)**

**A.** Don't use rock salt! Use instead a copper salt like copper sulfate (blue stone), available from most garden shops for mildew control.

Questions or tips sent to "Ask Bob," c/o MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bgrove@grove-ent.com. (Please include your name and address.) The current "Ask Bob" is now online at our WWW site: [www.grove-ent.com](http://www.grove-ent.com)



## Bob's Tip of the Month

# Intermittent Sony ICF-2010 Battery Operation

Unquestionably, the Sony ICF-2010 receiver is one of the most widely respected multiband portables ever produced, accounting for its longevity on the short wave market. However, we occasionally hear from users who find that, fresh from the factory, the radio won't work from its D-cell battery pack. The reason and cure are simple, requiring only a few minutes, a Philips-head screwdriver, and a pair of needle-nose pliers.

### The problem

The battery pack is part of the back cover assembly; connection to the circuit board is made by two spring contacts on the

D-cell compartment. Occasionally, one, or both, of these springs does not touch the solder pad on the circuit board. If your 2010 suffers from the dead-battery-pack malady, proceed as follows:

### The fix

(1) Place the radio face down on a soft surface and remove the seven screws from the back (one screw is under the battery compartment lid, and another is under the folded whip).

(2) Remove the back and examine the two metal contacts; one will be the end of the stiff wire spring (-), the other is a flat tab (+). Usually it is the flat tab that is bent at an

angle; using pliers, gently bend the tab so that it points straight toward the board (at right angles to the cabinet back).

(3) Set the back on the radio and see if it has some "spring" on both sides, indicating that the contacts are pressing against the circuit board. If not, bend either (or both) contacts slightly longer to make contact with the circuit board. Only minor pressure is necessary.

(4) Partially secure the back in place with two screws and insert the AA and D cells to test the radio. If that was the problem, and the contacts are now being made, the radio should now operate. If so, finish assembling with the remainder of the screws.

**Q.** As winter comes, I hear WWV on 2500 kHz and CHU on 3300 kHz with increased strengths; is there something in the atmosphere that causes this? (Patricia Sweeney, Tuba City, AZ)

**A.** Actually, it's what's *missing* from the atmosphere! During the summer, it's the aggregate electrical background noise from lightning storms worldwide that raises the background static levels, making signals sound weaker. During the winter, with the storms subsided in this hemisphere, the static is down, so the signals appear stronger in comparison.

**Q.** What effects do atmospheric conditions like temperature, humidity, and daylight have on scanner reception? Scott Edwards (West Melbourne, FL)

**A.** At low band (30-50 MHz), long-distance skip via the ionosphere is dominant; at high band (150-174 MHz), skip via tropospheric ducting from temperature inversions is common, and at UHF (450-960 MHz), ducting continues, but attenuation from moisture is a problem, reducing range 20-30%.

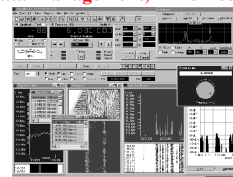
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# Reply Comments Pour in on Low Power FM Broadcasting

Federal Communications Commission (FCC) Chairman Bill Kennard told a September meeting of the National Association of Broadcasters (NAB) that he did not believe that allowing low and micro-power FM broadcasting would cause significant interference to existing FM stations. He said studies by FCC engineers using a wide range of inexpensive radios hold promise.

Kennard feels that LPFM will help schools, churches, city governments, and community groups get on the air at a time when AM/FM broadcasting is consolidating to fewer owners. The top telecommunications regulator believes that low power FM and digital radio – to which the FCC is committed – can coexist. “We need cooperation, not confrontation,” he said.

This past January, the FCC voted 4 to 1 to give tentative approval to Kennard’s plan to create thousands of three new classes of low-power FM radio stations, transmitting at 1 to 10 watts (Class LP-10), 100 watts (LP-100) and 1,000 watts (LP-1000) of power. The move reverses a 20-year old FCC ban, mandated by Congress, on the licensing of radio stations running under 1,000 watts.

The proceeding is now in the public “reply comment” period. Kennard’s low-power FM proposal has drawn sharp criticism from commercial broadcasters, especially the National Association of Broadcasters (NAB), National Public Radio (NPR) and the Corporation for Public Broadcasting (CPB) who fear interference and competition.

## ■ Internet radio alternatives

The broadcast industry alleges that Low Power Radio is not needed because “alternatives” – notably, Internet audio – are readily available. But reply comments filed by supporters of Micro and LPFM say that is not the case.

They argue that virtually all Americans have access to FM radio at home and in their car, while only a small minority have access to a computer and Internet audio. Furthermore, Internet audio is not currently available to the millions who primarily listen to radio while driving.

They cite a big disparity in Internet access

between lower income blacks and Hispanics on the Internet as compared with affluent Asians and Caucasians. “Any system which excludes 99.9% of the population from 100% of the publicly owned airwaves is discriminatory on its face.” In short, LPFM supporters do not believe that the Internet audio “audience” is typical of American demographics.

Another argument by Low Power Radio activists is that a handful of corporations control almost all of the radio, television and newspaper publishing “slots.” In some urban areas, one company owns all three media outlets.

## ■ Digital radio broadcasting

The NAB strongly supports the conversion of analog FM radio to digital and believes that LPFM puts that conversion in jeopardy. The transition system favored by most broadcasters is the “In Band On Channel” (IBOC) scheme which lets existing FM station owners broadcast in both digital and analog modes on their assigned frequency. Once digital radio receivers are in wide distribution, analog broadcasting would be discontinued. The FCC will be adopting a NPRM on digital radio on October 21. Reply comments close on LPFM fourteen days later.

The traditional broadcasting industry has taken the position that LP analog FM and digital IBOC radio broadcasting can not coexist. LPFM broadcasters disagree.

While Low Power FM activists agree that the digitalization of radio is inevitable, they are willing to make “reasonable accommodations” for it. But they do not want to be totally shut out of low power community broadcasting.

Most of America’s LPFM advocates see the “digitalization of radio as a costly attempt to fix a content problem with technology.” Adding, “Better program content – including more variety in programming, more local coverage and fewer advertisements would be a far more effective approach for reviving the sagging levels of listenership.”

## ■ Conflicts with public radio

National Public Radio and the Corporation

for Public Broadcasting worry that public radio stations might be displaced from the radio dial. The low power radio movement doubts that there would be wholesale “bumping.” But they question “Why shouldn’t Public Radio’s translator stations, or at least its satellitor stations, face the risk of displacement by local stations?” Translators and satellitors rebroadcast radio and satellite signals to fringe areas.

They add, “Should public radio satellitors be protected from local competition simply because they are subsidized? ... NPR may call such stations ‘affiliates,’ but real affiliates would have a local staff, a meaningful measure of local programming and operational autonomy.”

“While NPR and CPB public radio has a mission that is unique and extremely valuable to the larger society; the same can be said of low power radio. ... Public Radio is funded by the public but it is not run by the public. It is run by the Federal Government.”

## ■ NAB’s allegations of interference

Low power radio devotees question the accuracy of the NAB’s interference study. While the research did not find any serious risk of interference with car radios, it did say there was a significant interference risk in some metropolitan areas.

Recent studies conducted by the Media Access Project (MAP), the Committee for Democratic Communications of the National Lawyer’s Guild (CD), and the Micro-Empowerment Coalition (MEC), however, found exactly the opposite. Even the FCC’s own findings contradict the NAB interference study.

Micro-power advocates also point out that NAB’s findings are contradicted by “real world” experience. “Unlicensed broadcasters – many of them located in urban areas – have been transmitting with unregulated equipment for decades. Recent ‘busts’ of unlicensed broadcasters have not been based on complaints of interference. They have been based instead on a policy of enforcing ‘the letter of the law’...”

Also pointed out was that NAB’s interference study covered 60 different metropolitan areas. LPFM advocates point out that there are



# WHAT'S NEW?

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## Kaito Self-Powered Multiband Radio



A new entry into the line-up of self-powered electronics is the analog KA-007 multiband radio, which packs a *lot* of features into a surprisingly small package (166 x 138 x 68 cm).

The user can choose from four power sources: three AA batter-

ies (not supplied), solar power, hand-cranked dynamo, or the supplied AC adaptor. The radio's internal nickel metal hydride batteries can be charged using solar power, dynamo, or the AC adaptor. One minute of turning the dynamo handle equals about ten minutes of playing. When fully charged, the internal batteries will provide about 72 hours of playing time.

Tuning is by band slide switches and tuning knob. Available band selections are AM (530-1710 kHz), FM (88-108 MHz), TV1 (2-6 ch), TV2 (7-13 ch), VHF (145-175 MHz), Wx (162.55 - 164.40 MHz), SW (4-9 MHz; 9-14 MHz; 14-19 MHz; 19-26 MHz).

A telescoping whip with 360-degree rotation is provided for FM/ TV/ and shortwave reception, and a ferrite antenna for AM

reception is contained inside the radio. Shortwave reception can be improved by inserting a short wire antenna (provided) into the headphone jack; you cannot use the antenna and the ear phones simultaneously.

Made in China for Kaito Electronics, the KA-007 retails for \$49.95 and is available from Grove Enterprises (call 800-438-8155 or visit [www.grove-ent.com](http://www.grove-ent.com)).

## New SW Model from Baygen

Baygen, the company which first recognized the market for dynamo-powered radios, has introduced its newest model – the Baygen Global Shortwave Receiver. It should be appearing on the shelves around the end of



November.

The Global SW receiver will receive AM/FM/SW (5.8-18 MHz) and can be powered by dynamo, solar power, or AC adaptor. The Global is similar to Baygen's Freeplay shortwave model, except it is smaller, comes in a midnight blue case, and includes the solar power option.

The Global shortwave receiver will be available from your favorite radio stores, including Grove Enterprises, for \$99.95. Contact Grove at 800-438-8155 for more information.

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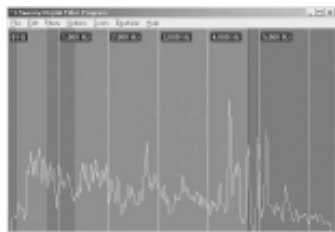
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## Digital Signal Processing (DSP) for the SWL

"Turn your PC into a real time DSP filter for Shortwave Listening!" says the press release from Thomas Swezey (rhymes with "easy"). Thomas says that, unlike other DSP products which implement FIR and/or IIR low pass or band pass audio filters, his program mathematically breaks the signal down into very narrow frequency bands on which it applies its various techniques. It then recombines the signal and plays it out through the speakers. All in real time!

Several of these techniques are not technically "filters" (the equalizer, for example), but do make the signal more pleasant to listen to.

You can create very narrow band pass, low pass, high pass or notch filters (or any combinations thereof) by pointing and dragging the mouse on the display, but the emphasis of the program is to make broad band audio sound better. For the acid test, try it on programs with a lot of musical content and see how they are enhanced.

All you need is a connection between the "Line Out" on your shortwave radio to the "Line In" on your PC's sound card; It runs under MS-Windows 95/98 and NT.

For a free evaluation copy (disabled by an intermittent buzz), go to <http://www.winternat.com/~swezeyt/dsp.htm> The licensed version of the program is \$39.95 from Thomas F. Swezey, 3214 Benjamin St. N.E., Minneapolis, MN 55418. Be sure to include the email address to which you want the program emailed.

## Rapid Recharger for Bearcats

MetroWest has come up with a solution to a common complaint—not enough operating time on stock scanner batteries. The Mini-Max 500 Smart Rapid Charger and nickel metal hydride battery pack works with BC 220, 230, 235 and 245 XLT and Sportcat scanners.

NiMH batteries hold a charge about twice as long as the nickel cadmium batteries which are supplied with these Bearcat scanners. The MetroWest battery pack may be fast charged in a little over 4 hours, and can be left in the cradle in a trickle charge mode to keep it 100% charged and ready for use.



The Mini-Max 500 Charger is \$55 – or \$80 if purchased together with the Battery Pack – from MetroWest (822 N. Spring, LaGrange Park, IL 60526; 800-657-1475). MetroWest also manufactures a Mini-Max 300 charger for NiCad battery packs for \$55.

## Get That Ham a Paddle!

Milestone Technologies has bought up a limited supply of factory surplus "real" paddles – heavy duty paddles capable of precise operation and built to last a lifetime. Imported from China, the Quadriom TA-1 is an excellent value at \$79.95.

The Chinese paddle features adjustable contact spacing, hard silver contacts, and a chrome

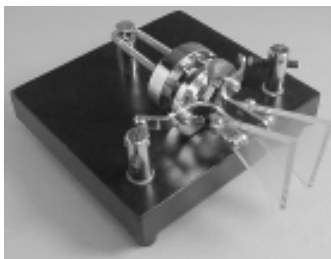


plated mechanism with steel needle bearings and nylon seats. They are surprisingly robust despite their delicate styling, and only an ordinary screwdriver is needed for adjustment.

These paddles have absolutely no markings and about all Marshall Emm knows about them is that they are called the Quadriom TA-1. (They'll present a real mystery to collectors a hundred years from now.) The paddles are in factory original styrofoam packaging, with some showing a bit of "warehouse wear," but they are in perfect working order.

The TA-1 weighs in at a whopping two and a quarter pounds! Approximate base dimensions are 3-3/4 x 4 inches.

For more information on this and other paddle designs, write or call Milestone Technologies, Inc., 2460 S. Moline Way, Aurora, CO 80014-1833; (800) 238-8205, or visit their web site at [www.MorseX.com](http://www.MorseX.com)



## AM Radio Log

The twentieth annual edition of this valuable resource contains radio station listings from the United States and Canada including up to the last minute information on the new stations in the Expanded band (1605-1705). Each station listing consists of its location, frequency, call, format, network affiliation, station

address, station slogan, day and night transmitter powers. There are cross references by city and by call letter. The log is packaged as 321 loose leaf pages punched for insertion in a binder.

Members of the National Radio Club, DX Audio Service, or International Radio Club of America may purchase the *AM Radio Log* for \$16.95. Non-member prices of the *AM Radio Log* are as follows: U.S. & Canada US\$22.95, Latin America US\$24.00; Europe US\$25.00, all others US\$28.00

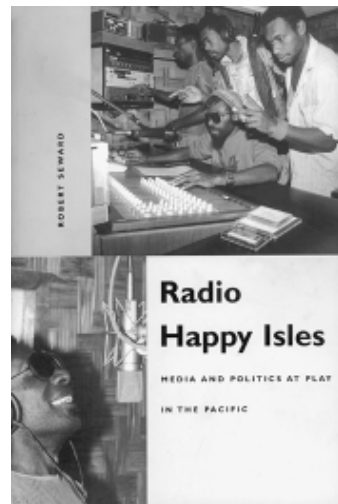
Send all orders to: National Radio Club, Publications Center, Box 164, Dept W, Mannsville NY 13661-0164 USA



## Radio Happy Isles

In our corner of the world, AM radio may seem archaic compared to new technologies like satellite TV and the internet. But in Pacific Island nations, radio is the essential information medium.

Not only does a single station often carry the burden of entertaining an entire population, it must also stand in for the telephone on unwired islands. Personal messages at a few cents a word, in fact, are a source of revenue for broadcasters in countries whose economic base will not support commercial adver-



tising. Government can fill in the funding, but then a station risks becoming a mere mouthpiece and losing its credibility.

Issues like these are explored in depth in Robert Seward's compelling book *Radio Happy Isles, Media and Politics at Play in the Pacific* (University of Hawai'i Press, ISBN 0-8248-2014-2). Seward, who spent six years in the Pacific listening to the radio, interviewing station personnel, and visiting newsrooms, shares his extensive research on the worst (probably Samoa's 2AP) and the best (definitely the Solomon Islands' Radio Happy Isles) broadcasters he encountered.

Seward's book contains lots of great tidbits, such as Samoa's policy of not allowing coverage of its Fono Parliament meetings, though proceedings of that same Parliament can be broadcast live. Far from gossip, however, it's a

solidly academic book complete with tables and appendices that will appeal to data hounds.

Radio Happy Isles covers the impact a wide range of conditions have on day-to-day station operation, from lack of resources as basic as a car at the news staff's disposal to the dangers of reporting on coups, insurrections, and the peccadilloes of absolute monarchs. Radio Free Bougainville, whose generators are reputedly fueled by coconut husks, gets a long look here, as does the formation of the Pacific news bureau, PACNEWS, and the role of large broadcasters like Radio Australia and Radio New Zealand in legitimizing controversial stories, all but forcing reluctant government-run stations to carry them.

DXers who have pulled in a few Pacific medium wave or shortwave stations will enjoy the way this book fleshes out their

listening experience, as will anyone interested in the rich interaction between media and society in developing nations.

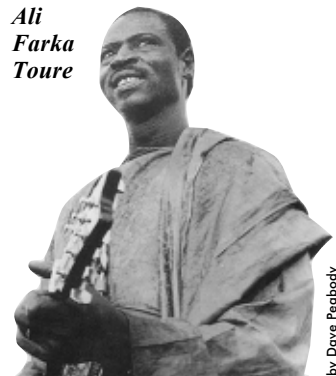
--Bob Tarte

## Radio Mali on CD

Many people get hooked on shortwave for a dose of high-voltage non-Western music. Some of the best is on the Tropical Bands, where reception is unreliable at best. A high-fidelity alternative to fighting static crashes comes with a new song collection by Grammy Award-winning West African guitarist Ali Farka Toure. In the 1970s Toure taped hours of music for Mali's national radio, and the best of these sessions is excerpted on the CD "Radio Mali" (World Circuit/Nonesuch Records).

Recorded back when "I was an absolute fool for the guitar" as Toure puts it, "Radio Mali" makes

Ali  
Farka  
Toure



by Dave Peabody

a strong case for the music of Northern Mali as the direct antecedent of the American blues tradition with its finger-picking guitar style and 'high-lonesome' nasal vocals. Singing in Sonrai and Peul, Toure also plays instruments you won't hear on your hometown AM station, like the ngoni lute and single-string ndjarka violin.

"Radio Mali" gets the deluxe packaging treatment with slipcase cover and 36-page full color

# NEW! 2000 POLICE CALL!

The new Police Call features over a half million frequency listings in nine regional volumes! Now including 18 additional categories, you will be equipped to monitor police and fire, business and industry, hospital and ambulance, public utilities and transportation, sports and entertainment, aviation and railroads, and much more! And if you're monitoring trunking, this edition now includes talk group ID codes.

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This "Scanner User's Bible" is now available on CD-ROM!





booklet containing a biography, song transcriptions, and lots of photos. Next time propagation woes set in, fire up this disc instead of your vintage Hammarlund. --Bob Tarte

## Midland WX receiver recall

Midland Consumer Radio Inc., of Kansas City, Mo., is recalling 9,000 weather radios. Only model 74-200 radios that have a serial number beginning with 904 or 905 are being recalled. These radios were sold from May 1999 through August 1999 for about \$70.

The radio contains a programming error, which can cause the device to fail to recognize certain

signals broadcast by the National Weather Service and potentially cause the consumer to miss a critical severe weather notice.

For replacement, return the recalled radio to the store where purchased or directly to Midland Consumer Radio. For more information, call the company toll-free at (877) 302-1904 weekdays between 8 a.m. and 4:30 p.m. CT.

For more information about recalls, visit CPSC's web site at <http://www.cpsc.gov>.

## Business news

• ICOM is running several promotional campaigns for the holiday season, all valid until December 31st. Customers who purchase the IC-R75 receiver are eligible to receive the digital signal pro-

cessing package UT-106 (a \$139.95 value) at no additional charge. The IC-R10 comes with a \$50 off coupon plus free programming cable and software. With purchase of the IC-PCR1000, you will also receive a free copy of the PerCon Spectrum Frequency Database CD. The PCR100 is \$50 off on the spot.

• Several new software programs and upgrades are available for the WinRadio series. Visit their

website for details. WinRadio now also offers a Trunking Option for all WinRADiO receiver models; visit <http://www.winradio.com> or call Grove at 800-438-8155 for pricing and details.

• Check out the new website for Computer International, US distributor for the VisualRadio and RadioCom software products, reviewed by John Catalano in the July and August 1999 issues: <http://www.computer-int.com>

**Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Hwy 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or e-mailed to [mteditor@grove-ent.com](mailto:mteditor@grove-ent.com).**

## REVIEW

# Active Shortwave Whip for Hand-helds

By Bob Grove

If you've ever tried to listen to medium wave and short wave signals on a wideband handheld scanner like those from Icom, AOR, and Alinco, you know how dismal the AM and SSB reception is with the little rubber duckie antenna provided by the manufacturer. Not only is the antenna woefully short to intercept adequate signal voltages, but the impedance mismatch is enormous. Not much signal gets to the radio. But that's all changed now.

The "Active Duck" is a low profile (7 inch) amplified whip that snaps right onto the BNC connector of your wide frequency coverage scanner, providing enormous increases

shortwave and medium wave signal strengths, and it doesn't have to be removed for VHF/UHF scanner reception.

The Active Duck comes with battery installed and, because of its low 1 mA current requirement, it lasts for 8-12 hours of operation before replacement is necessary.

Frequency range of operation is 0.5-1300 MHz, with 10-15 dB gain up to 60 MHz, and passive above 100 MHz to avoid intermod associated with amplified VHF/UHF antenna systems.

### Field Test

During our evaluation tests, we snapped the little Active Duck to the top of a wideband scanner,

switched it on, and were astounded by the enormous increase in signal strengths throughout the 0.5-30 MHz spectrum! Faintly detected broadcasters came thundering in, while what sounded like a dead CB channel suddenly came alive with signals.

We detected no apparent overload problems; clearly the JFET preamplifier circuit has excellent dynamic range, even at the low current drain required to operate the little amplifier. According to the manufacturer, they operated their prototypes under a transmitting tower to be sure that strong-signal overload would not be a problem before releasing the product.

The Active Duck is manufactured exclusively for Grove En-



terprises, and is available for \$49.95 by calling (800) 438-8155 for credit card orders, or mailing a check or money order to Grove Enterprises, PO Box 98, Brasstown, NC 28902. (See ad on page 89)

# Tigertronics BP-2M: Explore the Digital Side

By Ken Reitz KS4ZR

**S**hortwave listening is almost as old as the century and the bands are still packed with the voices and music of the world's nations as well as all of those strange sounds which indicate the presence of digital transmissions. You've enjoyed monitoring international broadcasters, utilities stations, numbers stations and amateur radio operators, but maybe you've stayed away from the digital modes because it all seemed too expensive and complicated.

Now BayPac has taken away those excuses and opened up another dimension in shortwave listening. All you need is your radio and a basic PC with an unused serial port.

Tigertronics has made their BayPac Model BP-2M, a multi-mode modem, so easy to use and versatile you'll wonder why you haven't gotten one before now! Measuring just over 2" square, the BP-2M slips into a com port on your computer and plugs into the speaker jack of your shortwave radio, scanner, or HT. Now, by bringing up any one of three dozen freeware, shareware or inexpensive commercial programs (all available on their website), you can access digital transmissions including SITOR A/B, BAUDOT, PACKET (HF & VHF), ASCII, RTTY, NAVTEX, WEFAX, AMTOR, SSTV, CW and many more.

To get you started right away the BP-2M is shipped with a copy of their own installation software and latest versions of the durable and well-designed HamCom and JVFAX programs, as well as a concise, five page *Installation & Operation* manual.

The only thing you'll have to do is fit the cable with a plug to fit whatever you're using for a signal source. Details for doing this are found in the manual. The installation disk has dozens of pages of "Common Questions & Problems" in addition to "Getting Started with Packet Commands." Forget about power supplies, the BP-2M uses only 9 mW and it gets that from the signal it's processing!

Once I installed the programs on my computer and attached a mini-plug to the modem's cable, I fired up my Kenwood TS-140 transceiver using an all-band outside antenna and started tuning the dials. After loading HamCom, I was "reading the

mail" on ham QSOs on 80, 40, 20, and 10 meters. The system was able to copy Tech Plus Morse code (CW) ops lumbering along at under 10 words per minute (WPM) as well as old hands zipping along at 40+ WPM. Even with atmospheric noise, local electrical hash, and the fact that both operators were slightly off each other's frequency, the copy was solid.

Switching to Slow Scan TV (SSTV), I tuned to 14.232 MHz, a standard SSTV frequency and, sure enough, the familiar and peculiar sound of an SSTV signal in progress was heard. Within seconds I had the JVFAX program up and an image from a ham in Florida was slowly filling the screen.

With very little practice, tuning WEFAX, SSTV, RTTY or CW is a breeze. Find an interesting image? You can save it for later viewing or to pass on to someone else by your own transmission. That's right; the BP-2M not only receives, but if you're a ham, you can transmit too! Even as a Technician Class operator you can use the BP-2M to expand your operating horizons.

Just for fun I shut down the Kenwood and reached for my old Uniden 2021, pulled out its telescoping antenna as far as it would go, plugged the modem into its speaker jack and started looking up WEFAX frequencies. Despite the interference from the computer's monitor less than a foot from the antenna, the minuscule size of the antenna, and the less than supersensitive receiver, within seconds the screen was filling with a shaky, but readable, weather chart from a coastal station over 1500 miles away. Not too bad!

The only difficulty I had was relearning



how to get around with DOS commands. As they warn in the manual "Never try to operate Baycom or any of the MultiMode programs from Windows ... BayCom requires the total undivided attention of the computer to work reliably." Once you get over that little obstacle, operations become routine.

The one thing I found extremely useful to have on hand with the BP-2M was this magazine. I went back through last year's copies of *MT* and checked out the *Digital Digest* "Baudot and Beyond" column and many others, including feature articles, which had extensive lists of HF frequencies and the various modes found operating there. Now when you come across those articles you'll read them with a new interest!

The BayPac BP-2M does not pretend to replace desktop stand-alone multi-mode terminal units. What it does, however, is allow those of us who can't even consider spending much money a chance to explore the digital world of the shortwave and VHF spectrum. While much of the operations are easy, some digital modes will be more of a challenge. But, that's what attracts us to this hobby anyway! If you like to experiment with tuning in on new modes, expanding your ham radio activities, and would like to do so for just \$69.95, the BP-2M is a great place to start.

BayPac Models BP-2 (Packet only) and BP-2M (Packet and Multi-mode) are available from Tigertronics, Inc., 400 Daily Lane, P.O. Box 5210, Grants Pass, OR 97527. Phone 800-822-9722 (orders only) 541-474-6700 or FAX: 541-474-6703. Visit their extensive website for updated information on all digital modes and available software: [www.tigertronics.com](http://www.tigertronics.com)





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*Monitoring Times assumes no responsibility for misrepresented merchandise.*

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**WANTED:** Phillips DC777 SW auto receiver, any condition. Phone/FAX 516-223-4638. Contact Earl.

**FOR SALE:** Grundig Yacht Boy 400, manual, 2 antennas, SW guide, in box. \$75. Radio Shack Pro 2050 base 300 channel trunking scanner. Antenna, manual, trunk freq. guide, in box. Have two—\$150 each. Radio Shack Pro 90 300 channel trunking hand-held scanner. Ni-cads, charger/adaptor, antenna, manual, in box. \$150. First cashiers check or money order gets your choice. I pay shipping. Lewis S. Harvey, 3 Egrets Nest Drive, Savannah, GA 31406-4258.

**FOR SALE:** Drake R8A with Grove SP200 speaker. Like new condition. \$700. ICOM R10 unblocked includes special antenna for cell phone freq and 12V power supply. \$275. Call 414-241-3348. Dick Robbins, 1200 West Sierra Lane, Mequon, WI 53092.

## Letters, continued from page 7

You might have seen him or the booth on "Tom Brokaw," on the "Today Show," on KTLA, or even in the German media!

George Appleton of Las Vegas, Nevada, says he was asked why he drove 80 miles to answer a telephone ("because it was fun, of course!").

"Where else could you be standing at a phone booth in the middle of the desert at 3 a.m. chatting with a taxi driver in Berlin?"

He first heard about the booth on a website and decided to do his bit for international relations. "Any ringing phone is hard to ignore — and this one rings constantly. Even the TV crews got into the spirit — all of us taking turns

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talking to people from all over the US and Canada, and countries from Finland to Brazil to New Zealand."



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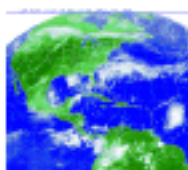
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U.S. GOES/WFAX image



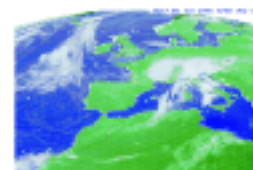
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